## GROUP 35B

# ANTI-LOCK BRAKING SYSTEM (ABS)

### CONTENTS


**GENERAL INFORMATION . . . . . 35B-2**

**SPECIFICATIONS . . . . . 35B-5**
- GENERAL SPECIFICATIONS . . . . . 35B-5
- SERVICE SPECIFICATIONS . . . . . 35B-5

**ABS DIAGNOSIS . . . . . 35B-5**
- INTRODUCTION . . . . . 35B-5
- ABS DIAGNOSTIC TROUBLESHOOTING STRATEGY . . . . . 35B-5
- DIAGNOSTIC FUNCTION . . . . . 35B-6
- DIAGNOSTIC TROUBLE CODE CHART . . 35B-8
- DIAGNOSTIC TROUBLE CODE PROCEDURES . . . . . 35B-10
- SYMPTOM CHART . . . . . 35B-146
- SYMPTOM PROCEDURES . . . . . 35B-146
- DATA LIST REFERENCE TABLE . . . . . 35B-164
- ACTUATOR TEST REFERENCE TABLE . . 35B-164
- CHECK AT ECU TERMINALS . . . . . 35B-165

**SPECIAL TOOLS . . . . . 35B-167**

**ON-VEHICLE SERVICE . . . . . 35B-168**
- HYDRAULIC UNIT CHECK . . . . . 35B-168
- IN THE EVENT OF A DISCHARGED BATTERY . . . . . 35B-170

**WHEEL SPEED SENSOR . . . . . 35B-171**
- REMOVAL AND INSTALLATION . . . . . 35B-171
- INSPECTION . . . . . 35B-173

**HYDRAULIC UNIT . . . . . 35B-175**
- REMOVAL AND INSTALLATION . . . . . 35B-175

# GENERAL INFORMATION

M1352000100982

The ABS that ensures directional stability and controllability during hard braking. ABS is standard equipment on the ES and GTS models but is optional equipment on the DE model.
This ABS employs a 4-sensor system that controls the right and left front wheels respectively, and has the following features:

- EBD *1 (Electronic Brake-force Distribution system) control that can obtain ideal rear wheel brake force has been employed.
- The magnetic encoder for detecting the wheel speed has been installed instead of the rotor as the wheel speed sensor.
- For wiring harness saving and secure data communication, CAN *2 bus has been adopted as a tool of communication with other ECUs.

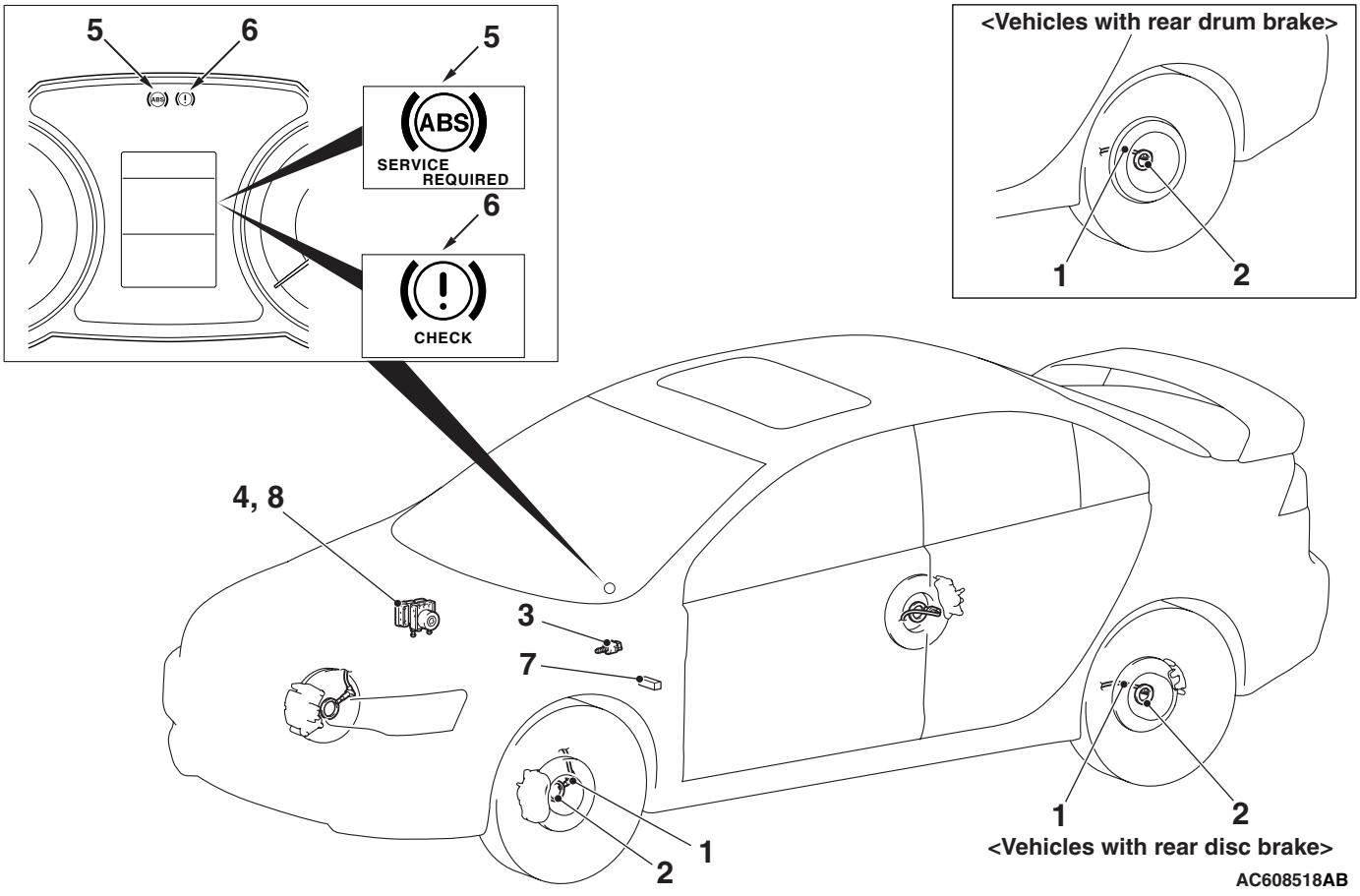
*NOTE:*

- **1: EBD (Electronic Brake-force Distribution)*
- **2: For more information about CAN (Controller Area Network), refer to GROUP 54C P.54C-2.*

## SPECIFICATIONS

| Item | | | Specifications |
|---|---|---|---|
| ABS control type | | | 4 sensors |
| Wheel speed sensor | Magnetic encoder | Front | 86 (N pole:43, S pole:43) |
| | | Rear | 86 (N pole:43, S pole:43) |
| | Type | | Semiconductor |

## CONSTRUCTION DIAGRAM

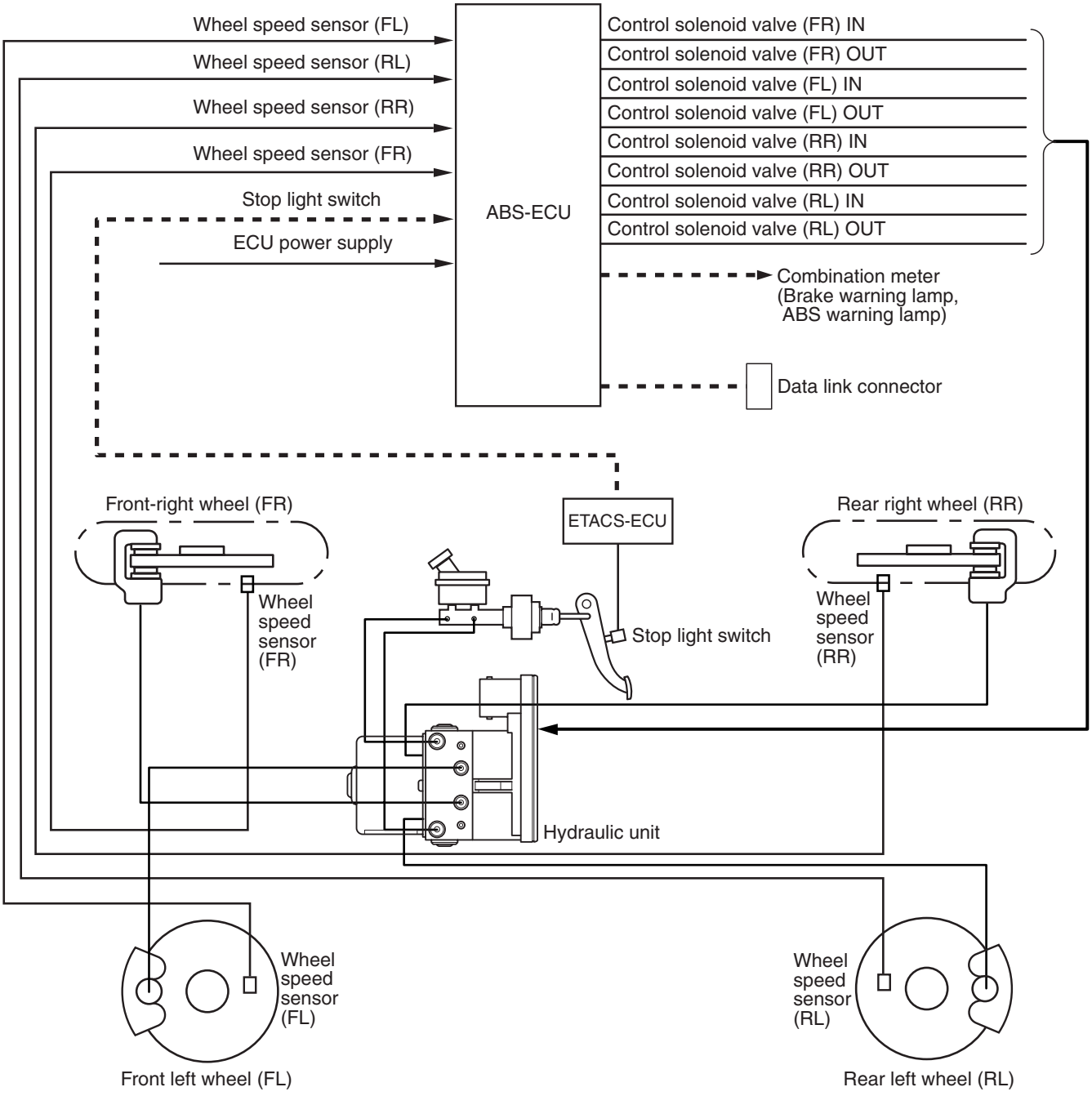



TSB Revision

## MAIN COMPONENTS AND FUNCTIONS

| Parts name | | No. | Functional description |
|---|---|---|---|
| Sensor | Wheel speed sensor | 1 | Outputs the frequency signal in proportion to the rotation speed of each wheel to ABS-ECU. |
| | Magnetic encoder for wheel speed detection | 2 | The wheel speed sensor is a pulse generator. When the magnetic encoder for wheel speed detection (a plate on which north and south pole sides of the magnets are arranged alternately) rotates, it outputs frequency pulse signal in proportion to each wheel speed. |
| | Stop light switch | 3 | Outputs the signal indicating whether the brake pedal is depressed or not through ETACS-ECU to ABS-ECU via the CAN line. |
| Actuator | Hydraulic unit | 4 | Drives the solenoid valve using the signal from ABS-ECU, and controls the brake fluid pressure for each wheel. |
| | ABS warning light | 5 | Informs the driver of the system status by illuminating, flashing, or turning off the warning light according to the signal from ABS-ECU. |
| | Brake warning light | 6 | Used as the warning light for the parking brake, brake fluid level, and EBD control. Informs the driver of the system status by illuminating or turning off the warning light according to the signal from ABS-ECU, ETACS or combination meter. |
| Data link connector | | 7 | The ABS-ECU establishes the communication with scan tool. |
| ABS control unit (ABS-ECU) | | 8 | Controls the actuators (described above) based on the signals coming from each sensor. |
| | | | Controls the self-diagnostic functions and fail-safe functions. |
| | | | Controls diagnostic function (Compatible with scan tool). |

## SYSTEM CONFIGURATION




AC608528AB

*NOTE: Dashed lines indicate the CAN bus communication lines.*

# SPECIFICATIONS

## GENERAL SPECIFICATIONS

M1352000200116

| Item | | | Specification |
|---|---|---|---|
| ABS control type | | | 4-sensor |
| Wheel speed sensor | Magnetic encoder | Front | 86 (N-pole: 43, S-pole: 43) |
| | | Rear | 86 (N-pole: 43, S-pole: 43) |
| | Type | | Semiconductor type |

## SERVICE SPECIFICATIONS

M1352000300997

| Item | Standard value |
|---|---|
| Wheel speed sensor current mA | 5.9 –8.4 or 11.8 –16.8 |
| Wheel speed sensor insulation resistance MΩ | 5 or more |

# ABS DIAGNOSIS

## INTRODUCTION

M1352012500512

The anti-lock brake system (ABS) operates differently from conventional brake systems. These differences include sounds, sensations, and vehicle performance that owners and service technicians who are not familiar with ABS may not be used to. Some operational characteristics may seem to be malfunctions, but they are simply signs of normal ABS operation. When diagnosing the ABS system, keep these operational characteristics in mind. Inform the owner of the kind of performance characteristics to expect from an ABS-equipped vehicle.

## ABS DIAGNOSTIC TROUBLE CODE DETECTION CONDITIONS

ABS diagnostic trouble codes (ABS DTCs) are set under different conditions, depending on the malfunction detected. Most ABS DTCs will only be set during vehicle operation. Some ABS DTCs will also be set during the ABS self-check immediately after the engine is started.

When you check if an ABS DTC will be displayed again after the DTC has been erased, you should duplicate the ABS DTC set conditions. Depending on the detection timing and set conditions for the specific ABS DTC, you must either drive the vehicle or turn the engine off and restart it. To set the proper conditions for that DTC again, refer to "ABS DTC SET CONDITIONS" for each ABS DTC that you are trying to reset.

## ABS DIAGNOSTIC TROUBLESHOOTING STRATEGY

M1352011101020

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find an ABS fault.

1. Gather information about the problem from the customer.
2. Verify that the condition described by the customer exists.
3. Check the vehicle for any ABS DTC.
4. If you cannot verify the condition and there are no ABS DTCs, the malfunction is intermittent. Refer to GROUP 00, How to use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.
5. If you can verify the condition but there are no ABS DTCs, or the system cannot communicate with the scan tool, check that the basic brake system is operating properly.
   - If the basic brake system is not operating properly, refer to the GROUP 35A, Basic Brake System Diagnosis P.35A-7.

| TSB Revision |
|---|

- If the basic brake system is operating properly, refer to GROUP 35A, Brake Booster Operating Check P.35A-21.

6. If there is an ABS DTC, record the number of the DTC, then erase the DTC from the memory using the scan tool.
7. Recreate the ABS DTC set conditions to see if the same ABS DTC will set again.
   - If the same ABS DTC sets again, perform the diagnostic procedures for the DTC. Refer to P.35B-8.
   - If you cannot get the same ABS DTC to set again, the malfunction is intermittent. Refer to GROUP 00, How to use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

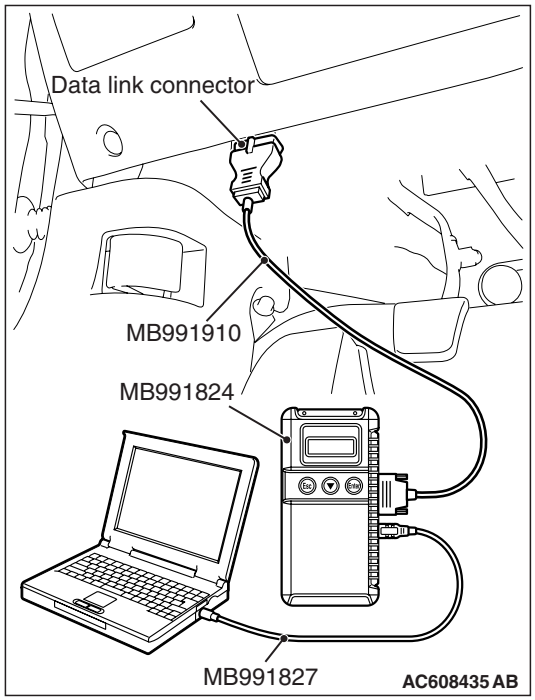
## DIAGNOSTIC FUNCTION

M1352011201179

## HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A




**⚠ CAUTION**

**To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.**

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to the special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch special tool MB991824 to the "ON" position.

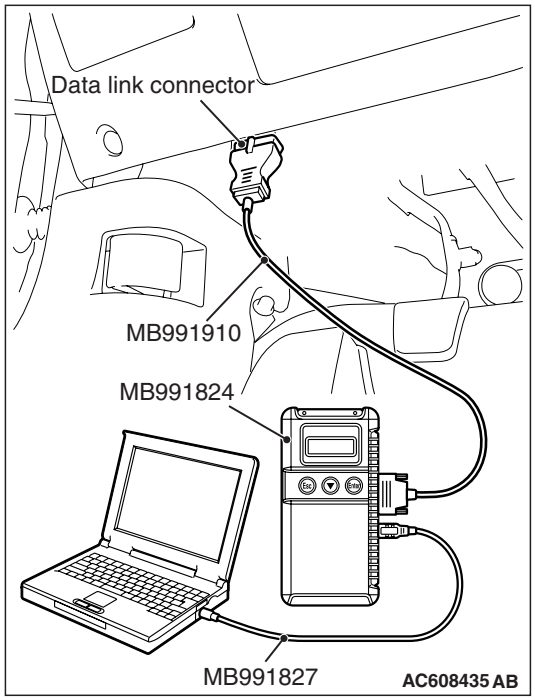
   *NOTE: When the special tool MB991824 is energized, the special tool MB991824 indicator light will be illuminated in a green color.*
7. Start the M.U.T.-III system on the personal computer.

*NOTE: Disconnect the scan tool MB991958 in the reverse order of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.*

## HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A




**⚠ CAUTION**

**To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.**

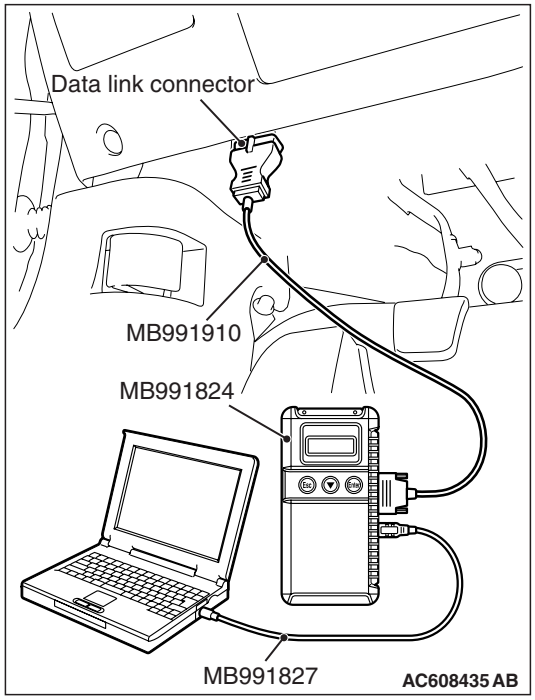
*NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.*

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System Select."
4. Select "ABS/ASC/ASTC" from the system list, and select the "OK" button.
5. Select "Diagnostic Trouble Code."
6. If a DTC is set, it is shown.
7. Choose "DTC erase" to erase the DTC.

## HOW TO READ DATA LIST

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A




**⚠ CAUTION**

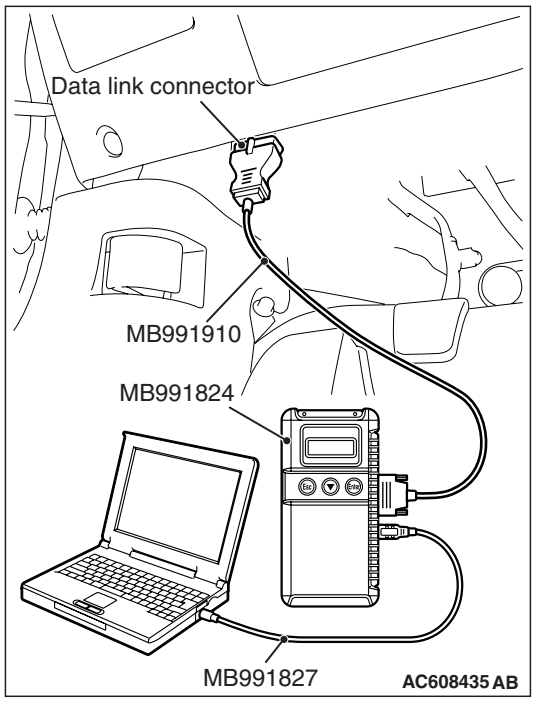
**To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.**

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System Select."
4. Select "ABS/ASC/ASTC" from the system list, and select the "OK" button.
5. Select "Data List."

## HOW TO PERFORM ACTUATOR TEST

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A




**⚠ CAUTION**

**To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.**

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Select "System Select."
4. Select "ABS/ASC/ASTC" from the system list, and select the "OK" button.
5. Choose "Actuator Test" from "ABS" screen.
6. Choose an appropriate item and select the "OK" button.

## DIAGNOSTIC TROUBLE CODE CHART

M1352011301314

**⚠ CAUTION**

**During diagnosis, a DTC code associated with other systems may be set when the ignition switch is turned on with connector(s) disconnected. On completion, check all systems for DTCs. If DTC code(s) are set, erase them all.**

| DTC | Inspection item | Reference page |
|---|---|---|
| C100A | Abnormality in FL wheel speed sensor circuit | P.35B-10 |
| C1015 | Abnormality in FR wheel speed sensor circuit | P.35B-15 |
| C1020 | Abnormality in RL wheel speed sensor circuit | P.35B-20 |
| C102B | Abnormality in RR wheel speed sensor circuit | P.35B-26 |
| C1011 | Abnormality in FL wheel speed sensor signal | P.35B-32 |
| C101C | Abnormality in FR wheel speed sensor signal | P.35B-39 |
| C1027 | Abnormality in RL wheel speed sensor signal | P.35B-46 |
| C1032 | Abnormality in RR wheel speed sensor signal | P.35B-53 |
| C1014 | Mutual monitoring of FL wheel speed sensor | P.35B-60 |
| C101F | Mutual monitoring of FR wheel speed sensor | P.35B-63 |
| C102A | Mutual monitoring of RL wheel speed sensor | P.35B-66 |
| C1035 | Mutual monitoring of RR wheel speed sensor | P.35B-69 |

**TSB Revision**

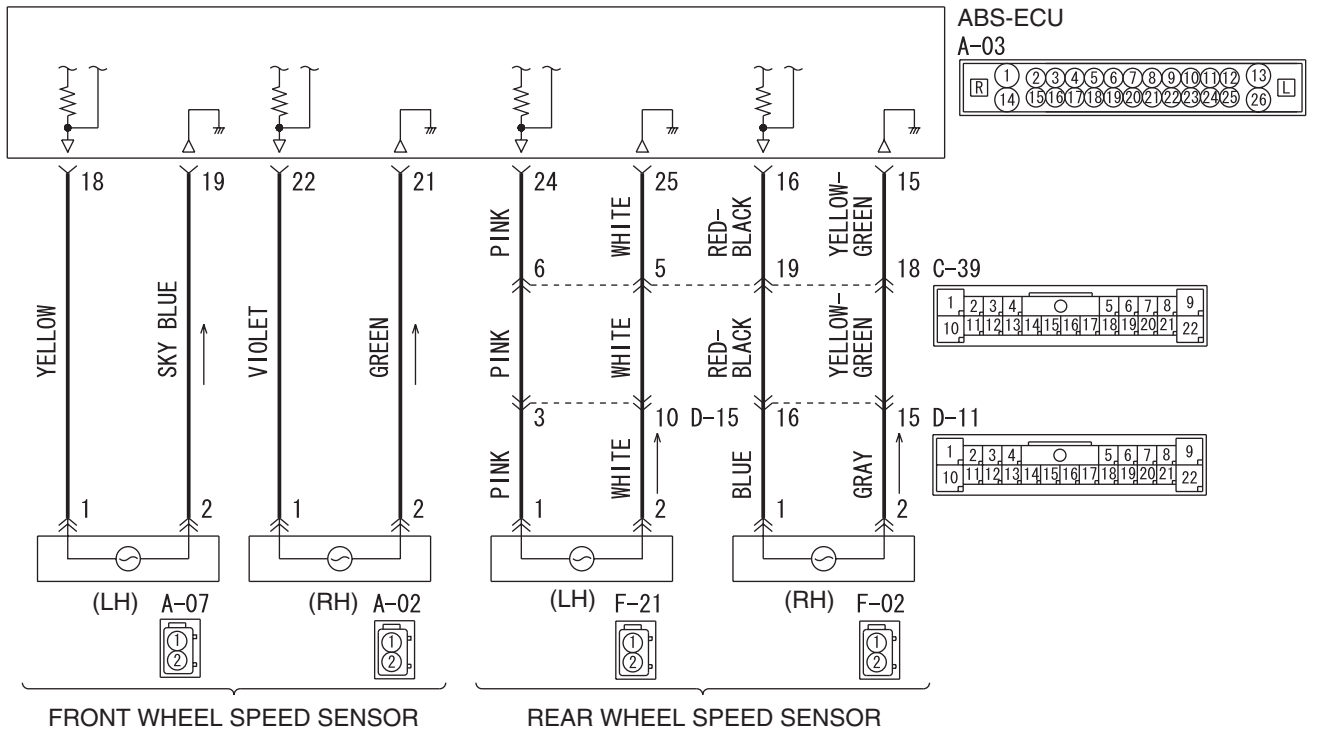
| DTC | Inspection item | | Reference page |
|---|---|---|---|
| C1041 | Abnormality in periodical signal for FL wheel speed sensor | | P.35B-72 |
| C1042 | Abnormality in periodical signal for FR wheel speed sensor | | P.35B-74 |
| C1043 | Abnormality in periodical signal for RL wheel speed sensor | | P.35B-76 |
| C1044 | Abnormality in periodical signal for RR wheel speed sensor | | P.35B-78 |
| C1046 | FL wheel speed sensor control phase time exceeded | | P.35B-80 |
| C1047 | FR wheel speed sensor control phase time exceeded | | P.35B-86 |
| C1048 | RL wheel speed sensor control phase time exceeded | | P.35B-92 |
| C1049 | RR wheel speed sensor control phase time exceeded | | P.35B-99 |
| C104B | Abnormality in FL wheel inlet valve system | | P.35B-106 |
| C104F | Abnormality in FR wheel inlet valve system | | |
| C1053 | Abnormality in RL wheel inlet valve system | | |
| C1057 | Abnormality in RR wheel inlet valve system | | |
| C105F | Abnormality in FL wheel outlet valve system | | |
| C1063 | Abnormality in FR wheel outlet valve system | | |
| C1067 | Abnormality in RL wheel outlet valve system | | |
| C105B | Abnormality in RR wheel outlet valve system | | |
| C2104 | Malfunction of valve power supply circuit | | P.35B-108 |
| C1073 | Malfunction of motor drive circuit | | P.35B-112 |
| C2116 | Abnormality in pump motor power supply voltage | | P.35B-116 |
| C1000 | Abnormality in stop light switch circuit | | P.35B-120 |
| C2200 | Abnormality in ABS-ECU | | P.35B-124 |
| C2100 | Abnormality in battery voltage (low voltage) | 9.7 ±0.3 V or less* | P.35B-125 |
| | | 8.0 ±0.5 V or less* | |
| C2101 | Abnormality in battery voltage (high voltage) | 18.0 ±1.0 V or more | P.35B-129 |
| C1395 | Brake fluid filling not completed | | P.35B-133 |
| C2203 | VIN not recorded | | P.35B-134 |
| C1608 | Implausible diagnosis data | | P.35B-135 |
| U0001 | Bus-off | | P.35B-141 |
| U0100 | Engine time-out error | | P.35B-141 |
| U0141 | ETACS time-out error | | |
| U1415 | Variant coding not implemented | | P.35B-142 |
| U1417 | Invalid variant coding value (including wrong assembly) | | P.35B-144 |

*NOTE: *: This diagnostic trouble code is not set within the vehicle speed of 20 km/h or less.*

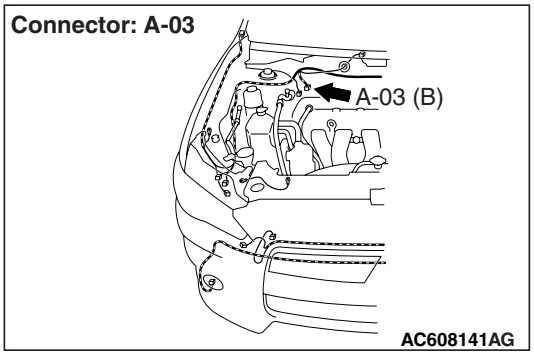
# DIAGNOSTIC TROUBLE CODE PROCEDURES

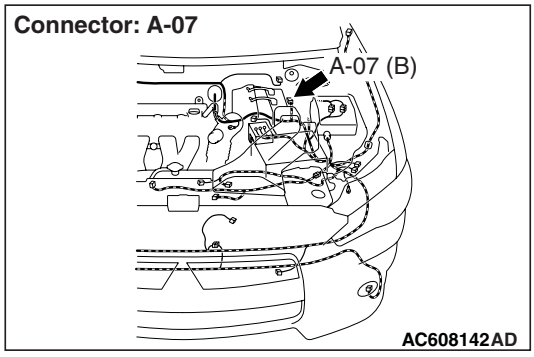
## DTC C100A: Abnormality in FL wheel speed sensor circuit

**Wheel Speed Sensor Circuit**




W8G35M000A




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

**TSB Revision**

## CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

## DTC SET CONDITIONS

ABS-ECU monitors the voltage fluctuation in each wheel speed sensor circuit. If ABS-ECU detects the open or short circuit, it will set a DTC.

## PROBABLE CAUSES

**Current trouble**

- Damaged wiring harness and connectors
- Noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction

**Past trouble**

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is the diagnostic trouble code C100A set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III data list**

Check the following service data (Refer to P.35B-164).

- Item No.01: FL wheel speed sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

**NO :** Go to Step 4.

**STEP 4. Voltage measurement at the A-03 ABS-ECU connector**

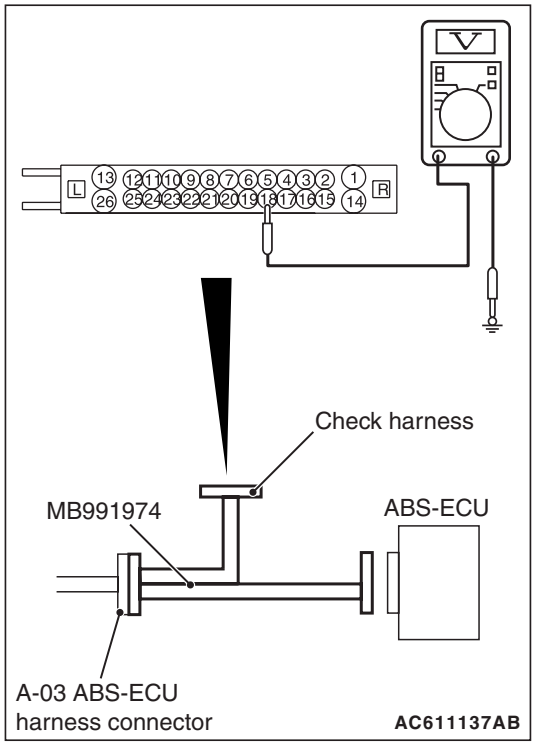
(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

(3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.18 and body ground, and between the ground terminal No.19 and body ground.

**OK: 1 volt or less**




**Q: Is the check result normal?**

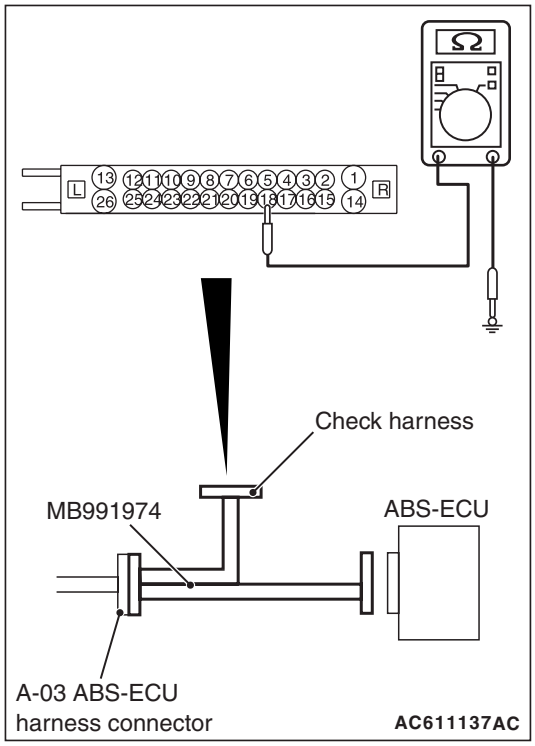
**YES :** Go to Step 5.

**NO (Not normal at the terminal No.18 or 19) :** Go to Step 6.

**STEP 5. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*




(2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No.18 and body ground, and between the ground terminal No.19 and body ground.

**OK: No continuity**

**Q: Is the check result normal?**

**YES :** Go to Step 8.

**NO (Not normal at the terminal No.18 or 19) :** Go to Step 6.

**STEP 6. Connector check: A-03 ABS-ECU connector, A-07 wheel speed sensor <FL> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 7.

**NO :** Repair the defective connector.

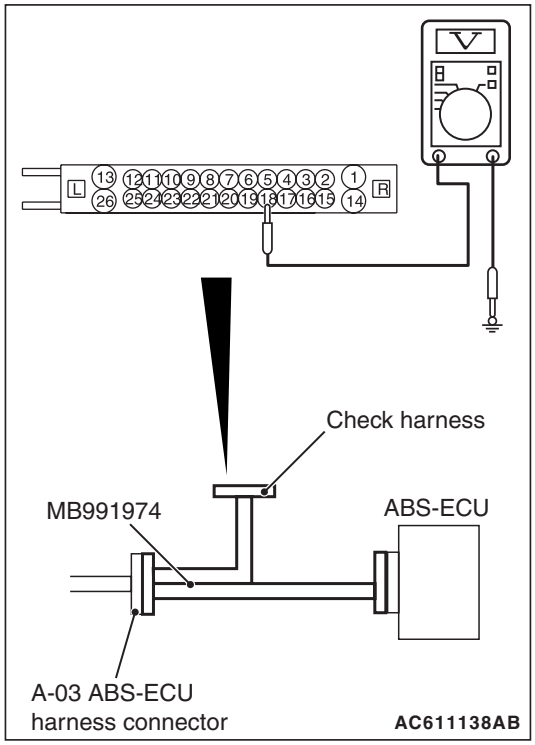
**STEP 7. Wiring harness check between A-03 ABS-ECU connector terminal No.18 and A-07 wheel speed sensor <FL> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.19 and A-07 wheel speed sensor <FL> connector terminal No.2.**

- Check for short circuit in wheel speed sensor <FL> circuit

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor <FL>.

**NO :** Repair the wiring harness.




**STEP 8. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No.18 and body ground.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 9.
**NO :** Go to Step 11.

**STEP 9. Wiring harness check between A-03 ABS-ECU connector terminal No.18 and A-07 wheel speed sensor <FL> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.19 and A-07 wheel speed sensor <FL> connector terminal No.2.**

- Check for open circuit in wheel speed sensor <FL> circuit

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Repair the wiring harness.

**STEP 10. Check for wheel speed sensor as a single unit**

Refer to P.35B-173.

**Q: Is the check result normal?**

**YES :** Go to Step 11.
**NO :** Replace the wheel speed sensor.

**STEP 11. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** Go to Step 12.
**NO :** Repair the defective connector.

**TSB Revision**

**STEP 12. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

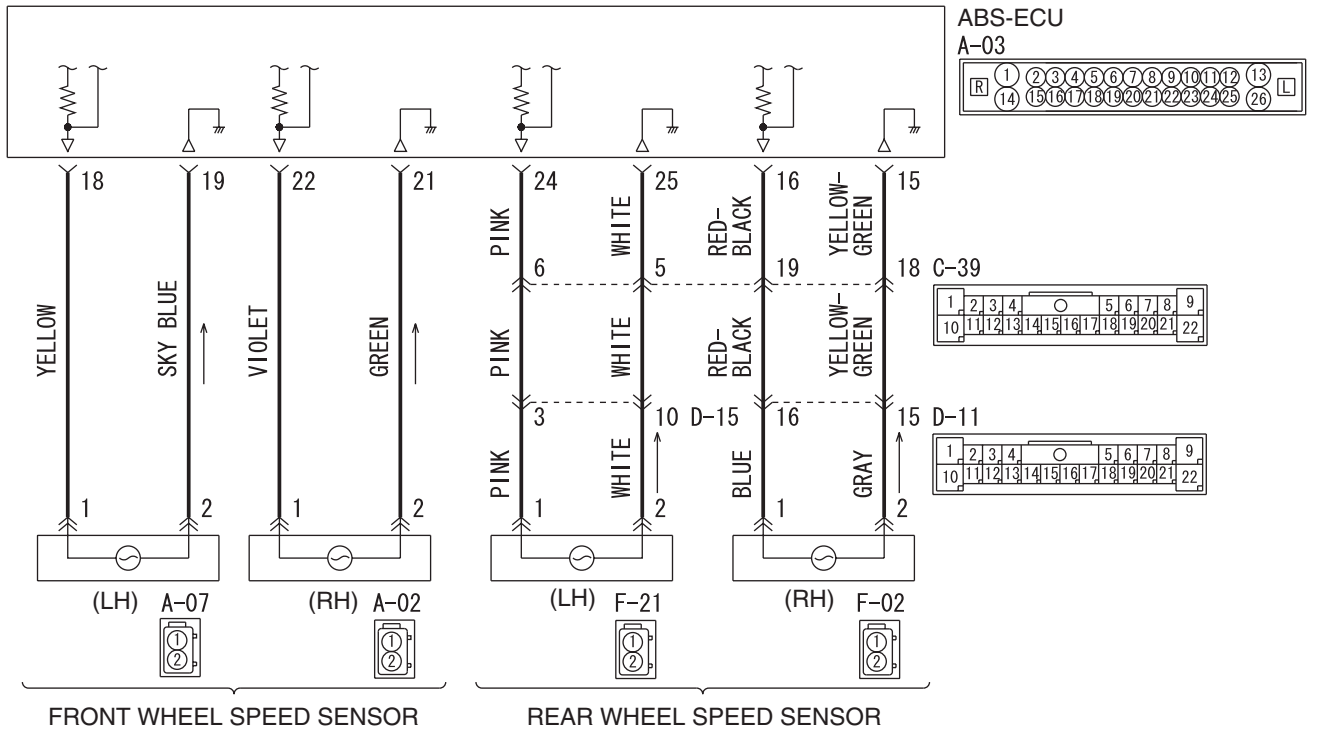
*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C100A set?**

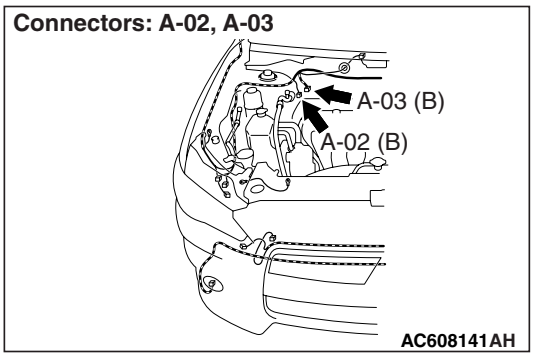
**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C1015: Abnormality in FR wheel speed sensor circuit

**Wheel Speed Sensor Circuit**




W8G35M000A




**TSB Revision**

⚠ CAUTION
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

## DTC SET CONDITIONS

ABS-ECU monitors the voltage fluctuation in each wheel speed sensor circuit. If ABS-ECU detects the open or short circuit, it will set a diagnostic trouble code.

## PROBABLE CAUSES

**Current trouble**

- Damaged wiring harness and connectors
- Noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction

**Past trouble**

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is the diagnostic trouble code C1015 set?**

**YES :** Go to Step 3.
**NO :** The procedure is complete.

**STEP 3. M.U.T.-III data list**

Check the following service data (Refer to P.35B-164).

- Item No.02: FR wheel speed sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).
**NO :** Go to Step 4.

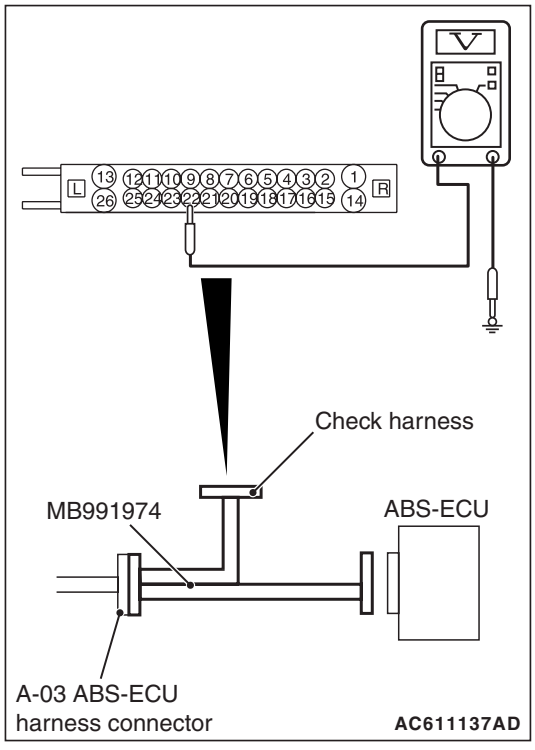
**STEP 4. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.22 and body ground, and between the ground terminal No.21 and body ground.

**OK: 1 volt or less**



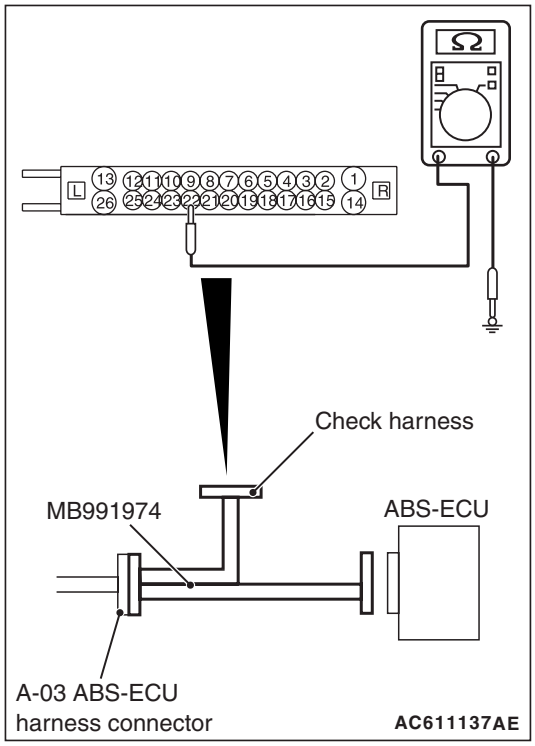

**Q: Is the check result normal?**

**YES :** Go to Step 5.
**NO (Not normal at the terminal No.22 or 21) :** Go to Step 6.

**STEP 5. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*




(2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No.22 and body ground, and between the ground terminal No.21 and body ground.

**OK: No continuity**

**Q: Is the check result normal?**

**YES :** Go to Step 8.

**NO (Not normal at the terminal No.22 or 21) :** Go to Step 6.

**STEP 6. Connector check: A-03 ABS-ECU connector, A-02 wheel speed sensor <FR> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 7.

**NO :** Repair the defective connector.

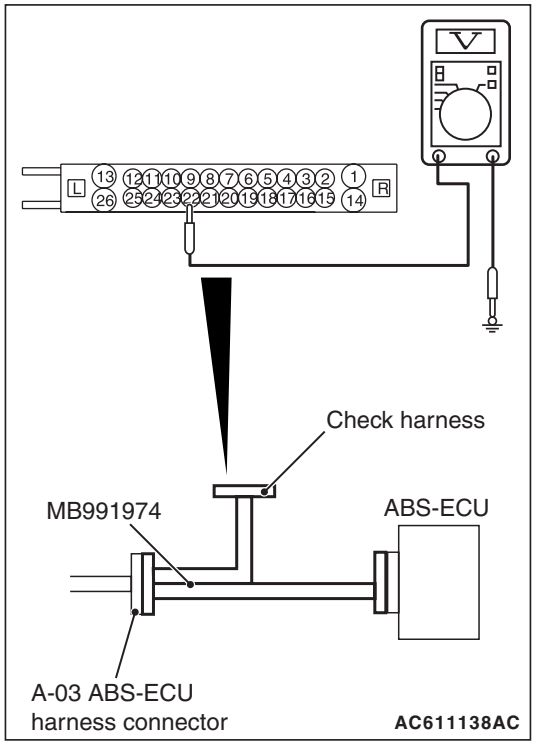
**STEP 7. Wiring harness check between A-03 ABS-ECU connector terminal No.22 and A-02 wheel speed sensor <FR> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.21 and A-02 wheel speed sensor <FR> connector terminal No.2.**

- Check for short circuit in wheel speed sensor <FR> circuit

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor <FR>.

**NO :** Repair the wiring harness.




**STEP 8. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No.22 and body ground.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 9.
**NO :** Go to Step 11.

**STEP 9. Wiring harness check between A-03 ABS-ECU connector terminal No.22 and A-02 wheel speed sensor <FR> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.21 and A-02 wheel speed sensor <FR> connector terminal No.2.**

- Check for open circuit in wheel speed sensor <FR> circuit

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Repair the wiring harness.

**STEP 10. Check for wheel speed sensor as a single unit**

Refer to P.35B-173.

**Q: Is the check result normal?**

**YES :** Go to Step 11.
**NO :** Replace the wheel speed sensor.

**STEP 11. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** Go to Step 12.
**NO :** Repair the defective connector.

**TSB Revision**

**STEP 12. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

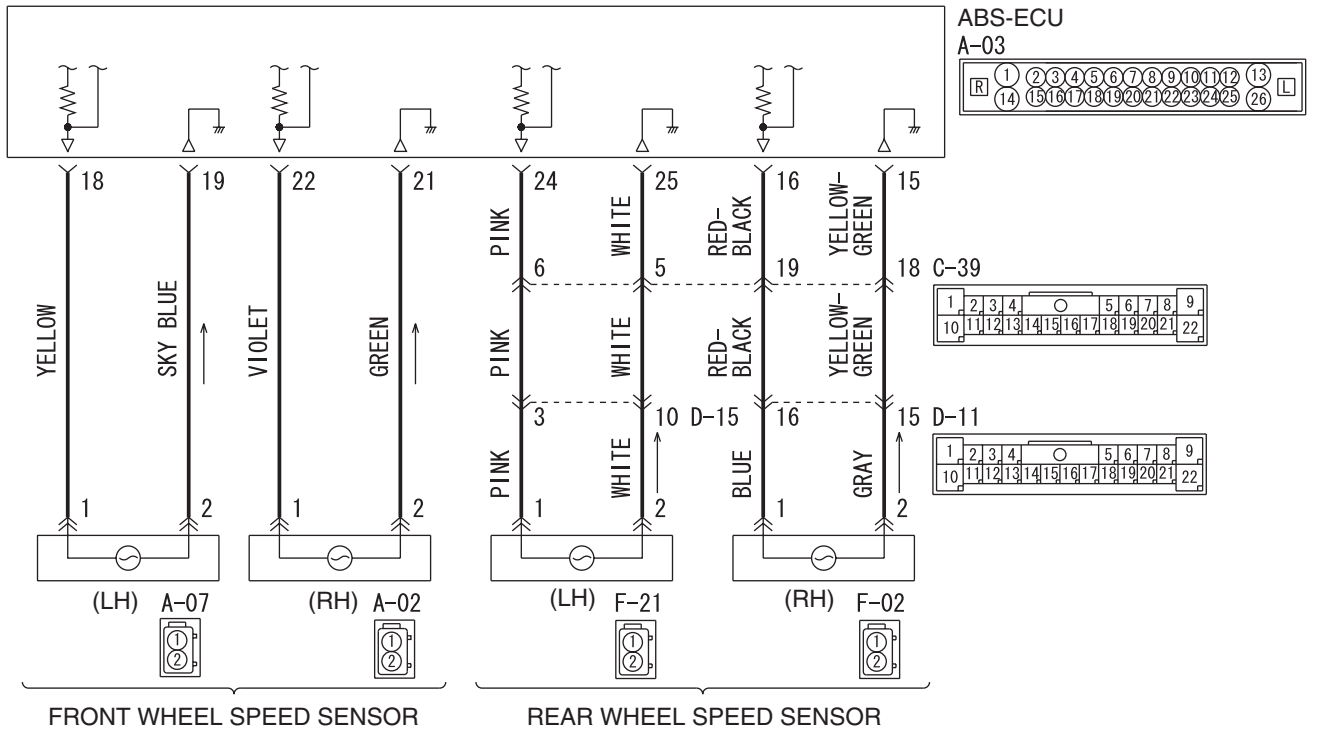
*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1015 set?**

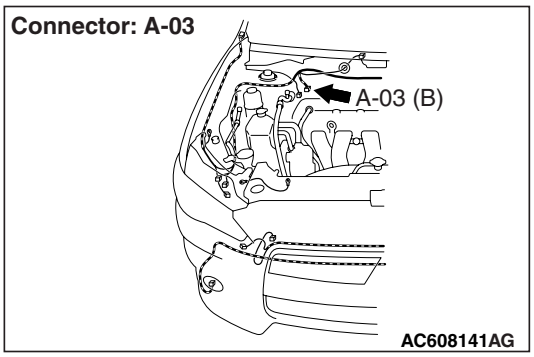
**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

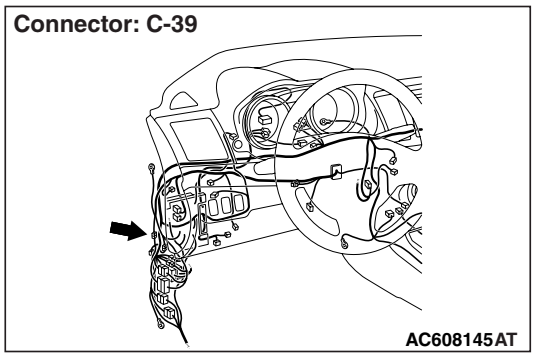
## DTC C1020: Abnormality in RL wheel speed sensor circuit

**Wheel Speed Sensor Circuit**

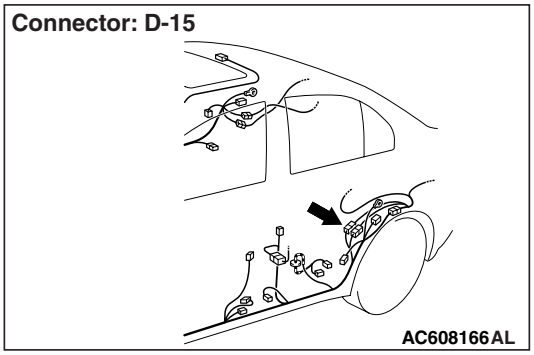


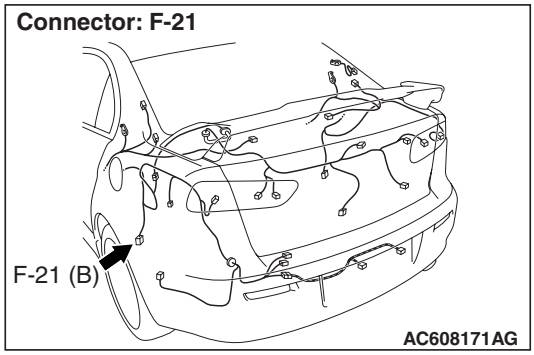

W8G35M000A




**TSB Revision**




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

## DTC SET CONDITIONS

ABS-ECU monitors the voltage fluctuation in each wheel speed sensor circuit. If ABS-ECU detects the open or short circuit, it will set a diagnostic trouble code.

## PROBABLE CAUSES

**Current trouble**

- Damaged wiring harness and connectors
- Noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction

**Past trouble**

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

**TSB Revision**

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is the diagnostic trouble code C1020 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III data list**

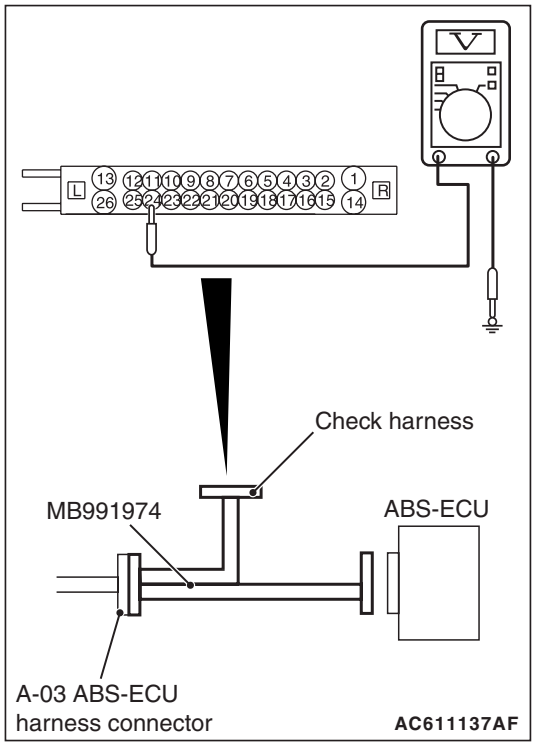
Check the following service data (Refer to P.35B-164).

- Item No.03: RL wheel speed sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

**NO :** Go to Step 4.




**STEP 4. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

(3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.24 and body ground, and between the ground terminal No.25 and body ground.

**OK: 1 volt or less**

**Q: Is the check result normal?**

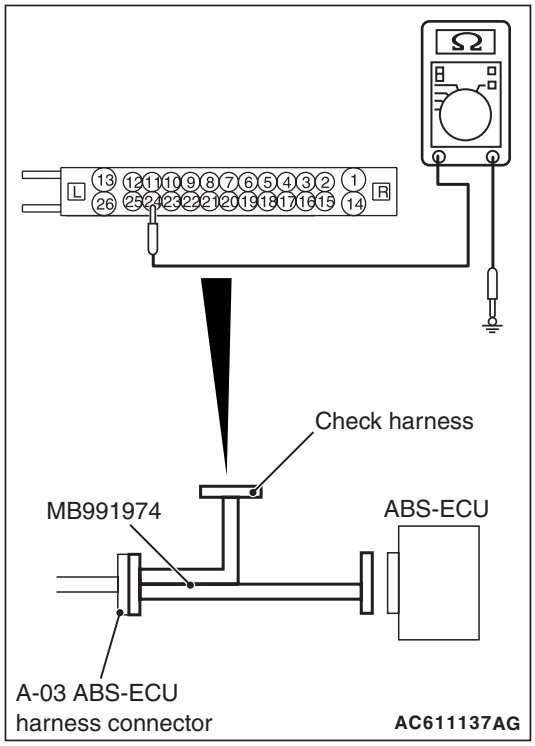
**YES :** Go to Step 5.

**NO (Not normal at the terminal No.24 or 25) :** Go to Step 6.

**STEP 5. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*




(2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No.24 and body ground, and between the ground terminal No.25 and body ground.

**OK: No continuity**

**Q: Is the check result normal?**

**YES :** Go to Step 8.

**NO (Not normal at the terminal No.24 or 25) :** Go to Step 6.

**STEP 6. Connector check: A-03 ABS-ECU connector, C-39 and D-15 intermediate connector, F-21 wheel speed sensor <RL> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 7.

**NO :** Repair the defective connector.

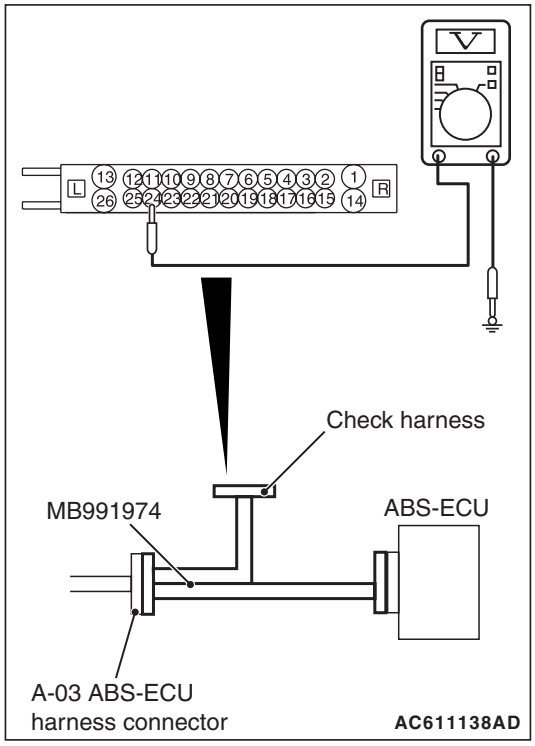
**STEP 7. Wiring harness check between A-03 ABS-ECU connector terminal No.24 and F-21 wheel speed sensor <RL> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.25 and F-21 wheel speed sensor <RL> connector terminal No.2.**

- Check for short circuit in wheel speed sensor <RL> circuit

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor <RL>.

**NO :** Repair the wiring harness.




**STEP 8. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No.24 and body ground.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 9.
**NO :** Go to Step 11.

**STEP 9. Wiring harness check between A-03 ABS-ECU connector terminal No.24 and F-21 wheel speed sensor <RL> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.25 and F-21 wheel speed sensor <RL> connector terminal No.2.**

- Check for open circuit in wheel speed sensor <RL> circuit

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Repair the wiring harness.

**STEP 10. Check for wheel speed sensor as a single unit**

Refer to P.35B-173.

**Q: Is the check result normal?**

**YES :** Go to Step 11.
**NO :** Replace the wheel speed sensor.

**STEP 11. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** Go to Step 12.
**NO :** Repair the defective connector.

**TSB Revision**

**STEP 12. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

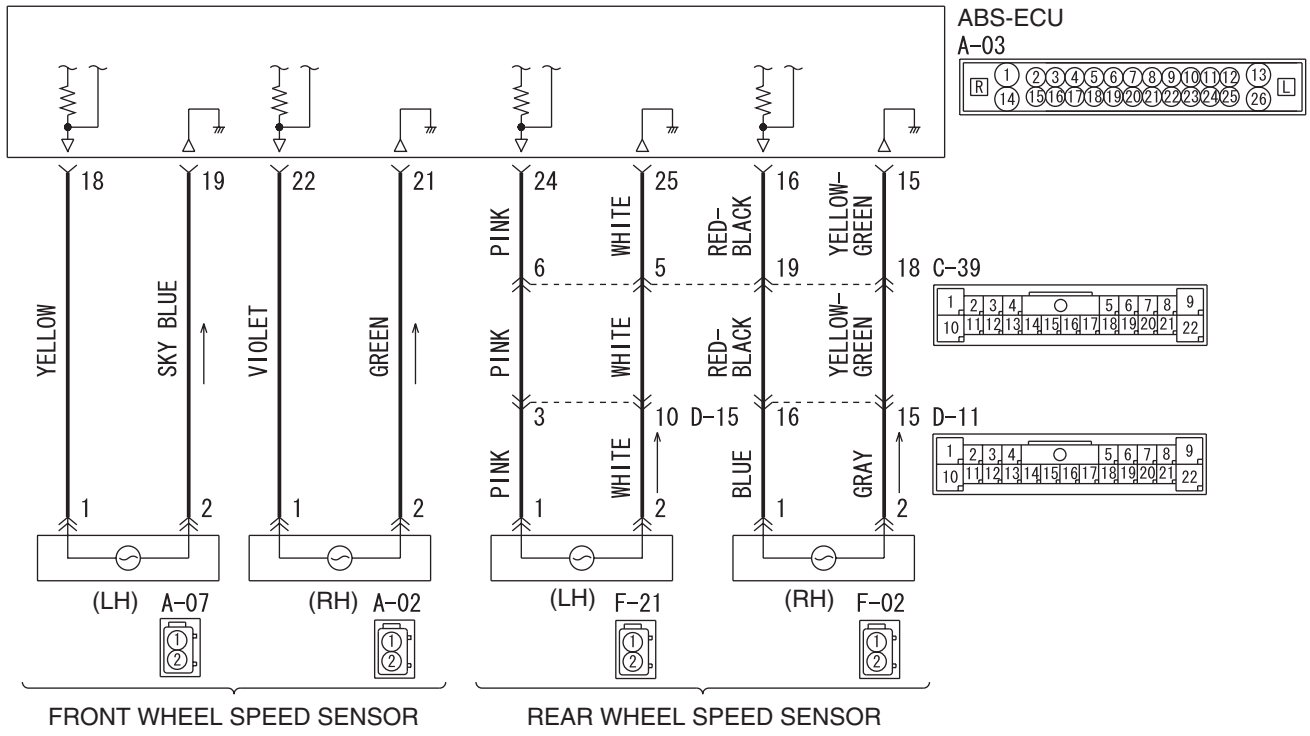
*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1020 set?**

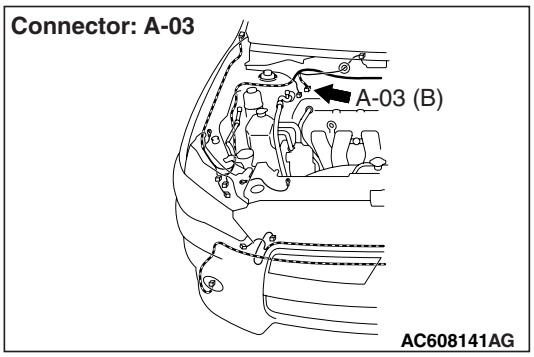
**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

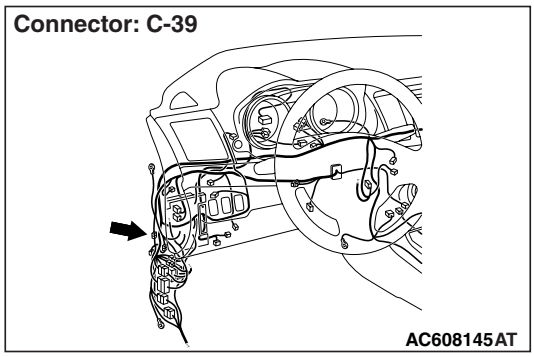
## DTC C102B: Abnormality in RR wheel speed sensor circuit

**Wheel Speed Sensor Circuit**

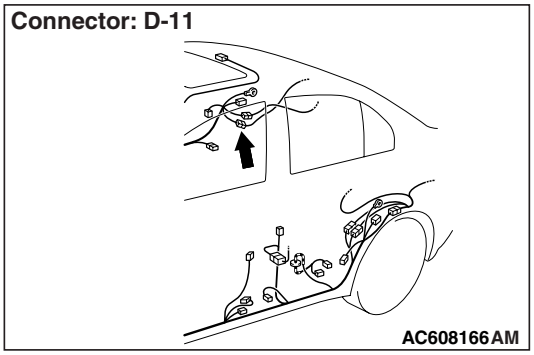


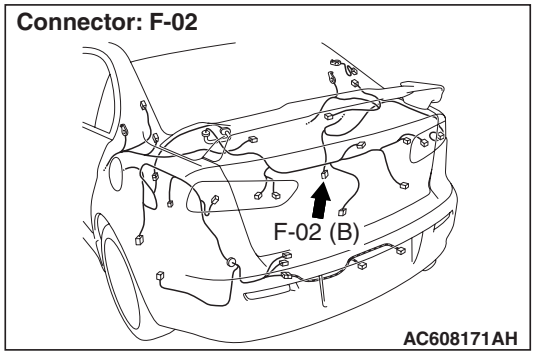

W8G35M000A




**TSB Revision**




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

## DTC SET CONDITIONS

ABS-ECU monitors the voltage fluctuation in each wheel speed sensor circuit. If ABS-ECU detects the open or short circuit, it will set a diagnostic trouble code.

## PROBABLE CAUSES

**Current trouble**

- Damaged wiring harness and connectors
- Noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction

**Past trouble**

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

**TSB Revision**

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is the diagnostic trouble code C102B set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III data list**

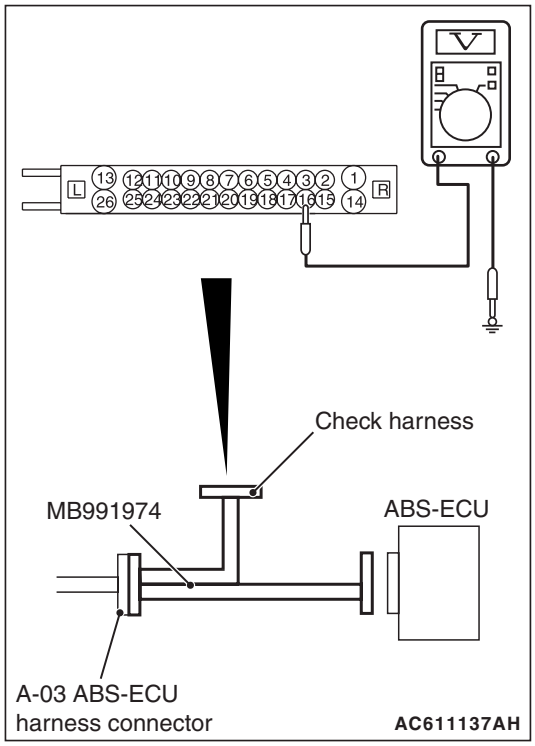
Check the following service data (Refer to P.35B-164).

- Item No.04: RR wheel speed sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

**NO :** Go to Step 4.




**STEP 4. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

(3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.16 and body ground, and between the ground terminal No.15 and body ground.

**OK: 1 volt or less**

**Q: Is the check result normal?**

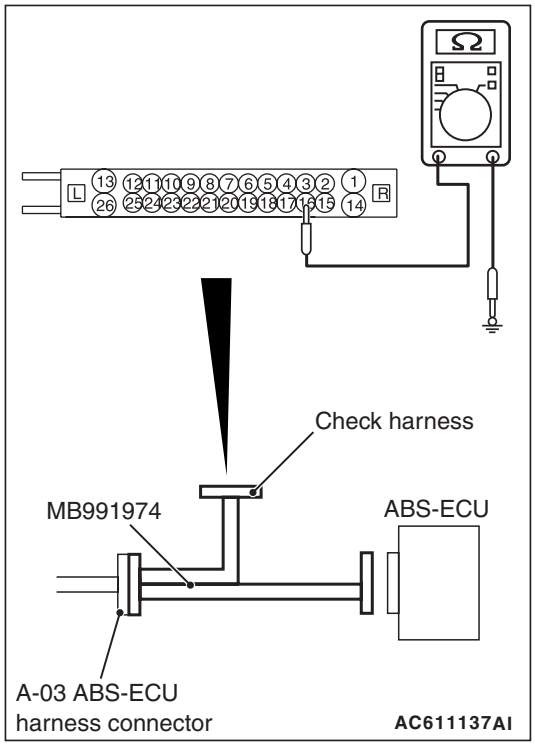
**YES :** Go to Step 5.

**NO (Not normal at the terminal No.16 or 15) :** Go to Step 6.

**STEP 5. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*




(2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No.16 and body ground, and between the ground terminal No.15 and body ground.

**OK: No continuity**

**Q: Is the check result normal?**

**YES :** Go to Step 8.

**NO (Not normal at the terminal No.16 or 15) :** Go to Step 6.

**STEP 6. Connector check: A-03 ABS-ECU connector, C-39 and D-11 intermediate connector, F-21 wheel speed sensor <RL> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 7.

**NO :** Repair the defective connector.

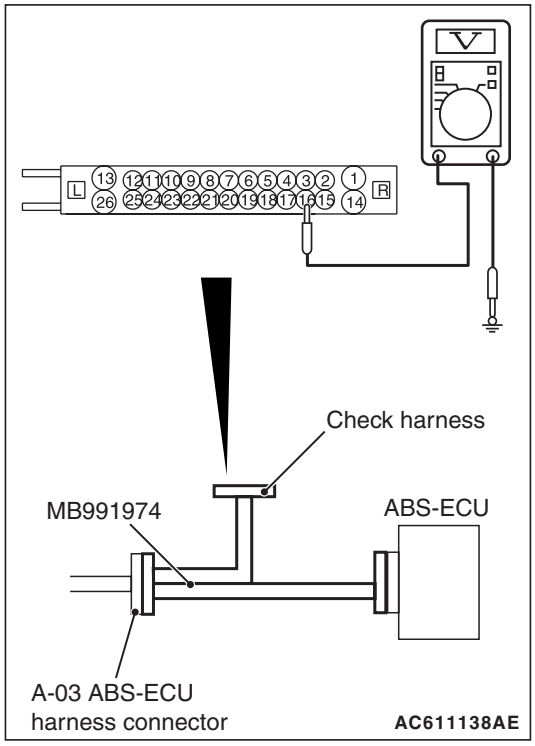
**STEP 7. Wiring harness check between A-03 ABS-ECU connector terminal No.16 and F-02 wheel speed sensor <RR> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.15 and F-02 wheel speed sensor <RR> connector terminal No.2.**

- Check for short circuit in wheel speed sensor <RR> circuit

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor <RR>.

**NO :** Repair the wiring harness.




**STEP 8. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No.16 and body ground.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 9.
**NO :** Go to Step 11.

**STEP 9. Wiring harness check between A-03 ABS-ECU connector terminal No.16 and F-02 wheel speed sensor <RR> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.15 and F-02 wheel speed sensor <RR> connector terminal No.2.**

- Check for open circuit in wheel speed sensor <RR> circuit

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Repair the wiring harness.

**STEP 10. Check for wheel speed sensor as a single unit**

Refer to P.35B-173.

**Q: Is the check result normal?**

**YES :** Go to Step 11.
**NO :** Replace the wheel speed sensor.

**STEP 11. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** Go to Step 12.
**NO :** Repair the defective connector.

**TSB Revision**

**STEP 12. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

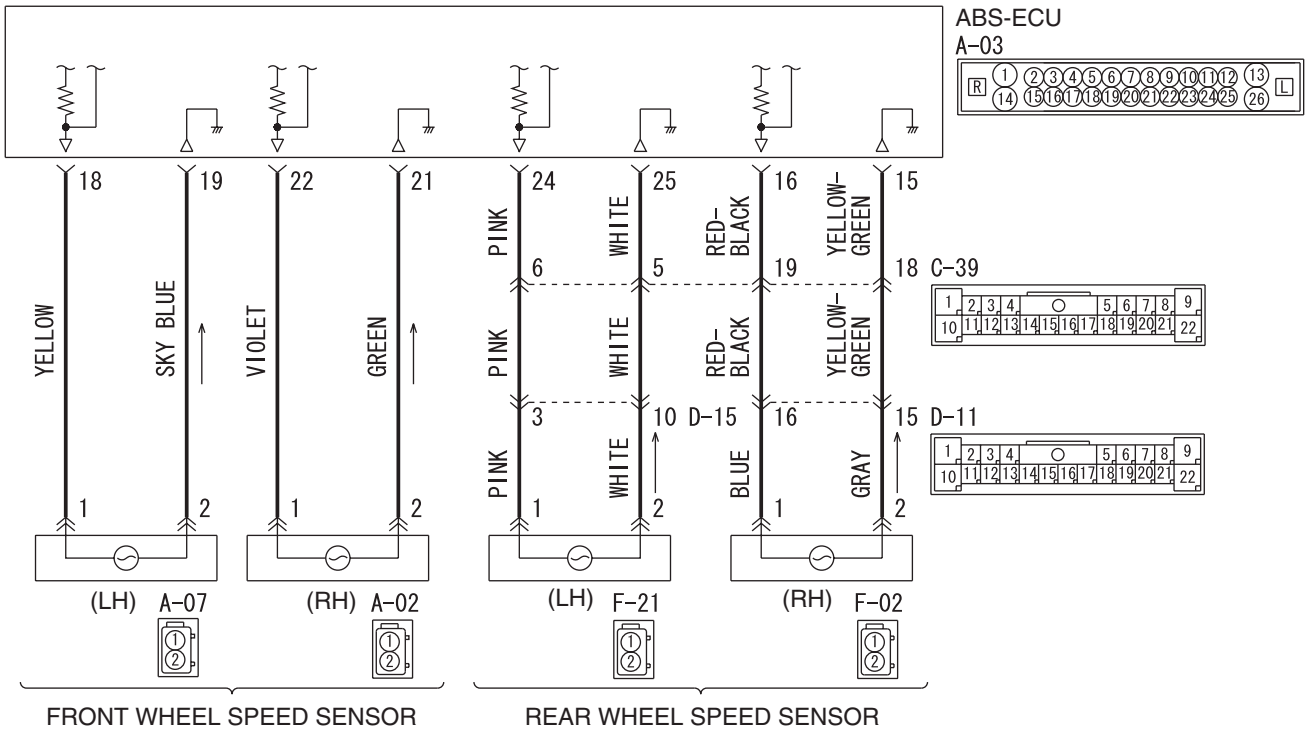
*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C102B set?**

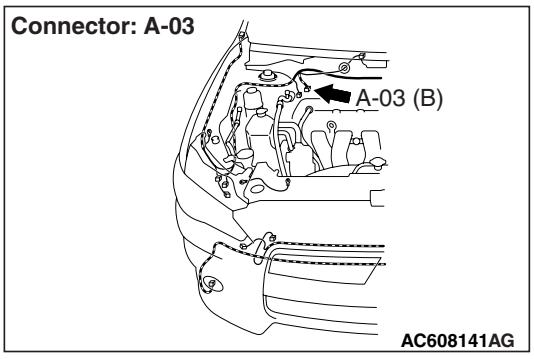
**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

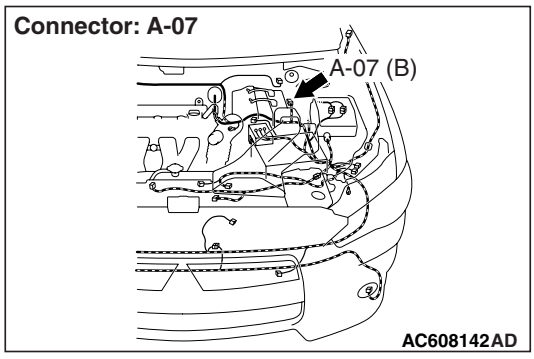
## DTC C1011: Abnormality in FL wheel speed sensor signal

**Wheel Speed Sensor Circuit**




W8G35M000A




**TSB Revision**

⚠ CAUTION
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

## DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Irregular change in the wheel speed sensor signal
- Wheel speed sensor signal continuously indicates higher value than the values of other wheel speed sensors.

## PROBABLE CAUSES

**Current trouble**

- Excessive gap between the wheel speed sensor and the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- Wheel bearing malfunction
- Malfunction of wheel speed sensor
- Damaged wiring harness and connectors
- External noise interference
- Improper installation of the wheel speed sensor
- Deformation of the magnetic encoder for wheel speed detection
- ABS-ECU malfunction
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection
- The number of poles on the magnetic encoder for wheel speed detection (the number of N-pole and S-pole) is changed.

**Past trouble**

- When the diagnostic trouble code No.C100A is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).
- When the diagnostic trouble code No.C100A is not set, the following conditions may be present:
  - Right or/and left wheels are rotated.
  - Unstable vehicle attitude
  - External noise interference
  - Vehicle ran with the parking brake applied.

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1011 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check that the diagnostic trouble code No.C100A is also set.

**Q: Is DTC C100A also set?**

**YES :** Perform the diagnosis for the diagnostic trouble code No.C100A (Refer to P.35B-10).

**NO :** Go to Step 4.

**STEP 4. Check wheel speed sensor installation**

Check how the wheel speed sensor <FL> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

**Q: Is the check result normal?**

**YES :** Go to Step 5.

**NO :** Reinstall the wheel speed sensor correctly.

**STEP 5. Check for wheel speed sensor as a single unit**

**Q: Is the check result normal?**

**YES :** Go to Step 6.
**NO :** Replace the wheel speed sensor.

**STEP 6. Check for wheel bearing looseness**

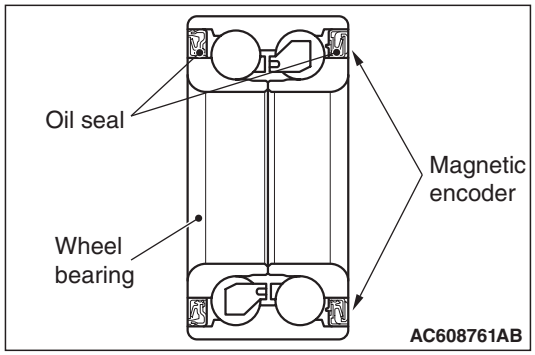
*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FL> for looseness (Refer to GROUP 26 –On-vehicle Service P.26-8).*

**Q: Is the check result normal?**

**YES :** Go to Step 7.
**NO :** Replace the wheel bearing.

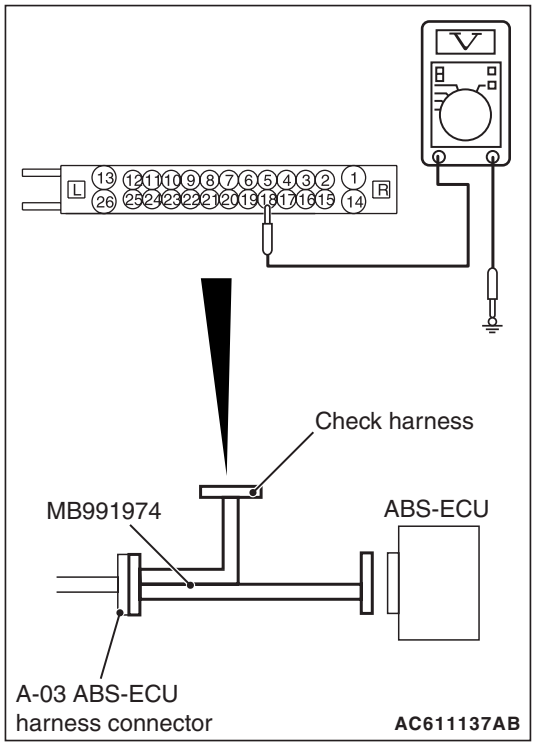
**STEP 7. Check wheel speed detection encoder**

Check the encoder for adhesion of foreign materials or deformation.




**Q: Is the check result normal?**

**YES :** Go to Step 8.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.
**NO (Deformation) :** Replace the wheel bearing.




**STEP 8. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

(3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.18 and body ground, and between the ground terminal No.19 and body ground.

**OK: 1 volt or less**

**Q: Is the check result normal?**

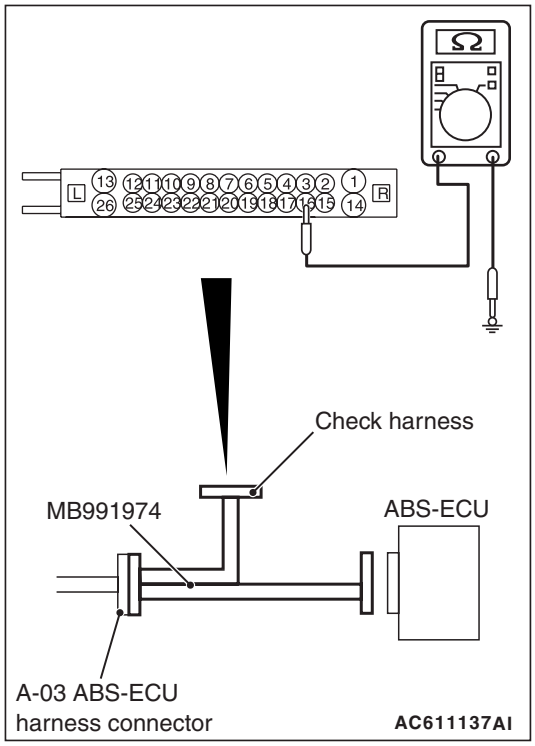
**YES :** Go to Step 9.

**NO (Not normal at the terminal No.18 or 19) :** Go to Step 10.

**STEP 9. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*




(2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No.18 and body ground, and between the ground terminal No.19 and body ground.

**OK: No continuity**

**Q: Is the check result normal?**

**YES :** Go to Step 12.

**NO (Not normal at the terminal No.18 or 19) :** Go to Step 10.

**STEP 10. Connector check: A-03 ABS-ECU connector, A-07 wheel speed sensor <FL> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 11.

**NO :** Repair the defective connector.

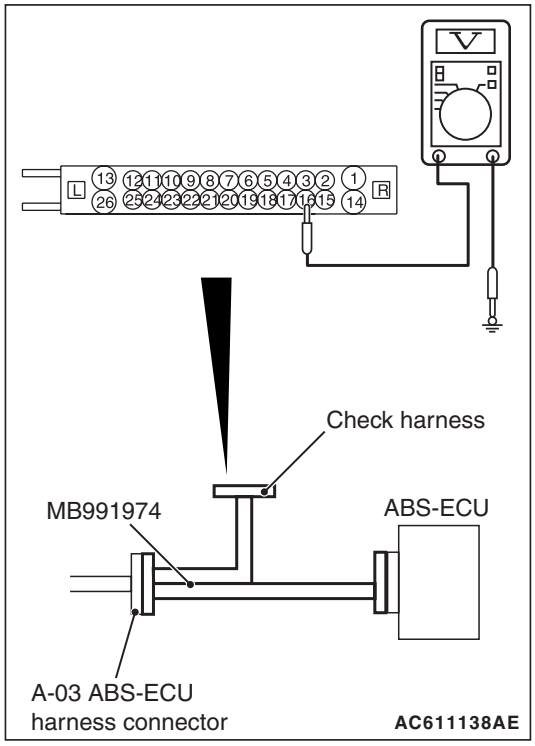
**STEP 11. Wiring harness check between A-03 ABS-ECU connector terminal No.18 and A-07 wheel speed sensor <FL> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.19 and A-07 wheel speed sensor <FL> connector terminal No.2.**

- Check for short circuit in wheel speed sensor <FL> circuit

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor <FL>.

**NO :** Repair the wiring harness.




**STEP 12. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No.18 and body ground.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 13.
**NO :** Go to Step 15.

**STEP 13. Connector check: A-03 ABS-ECU connector, A-07 wheel speed sensor <FL> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 14.
**NO :** Repair the defective connector.

**STEP 14. Wiring harness check between A-03 ABS-ECU connector terminal No.18 and A-07 wheel speed sensor <FL> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.19 and A-07 wheel speed sensor <FL> connector terminal No.2.**

- Check for open circuit in wheel speed sensor <FL> circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 15.
**NO :** Repair the wiring harness.

**STEP 15. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

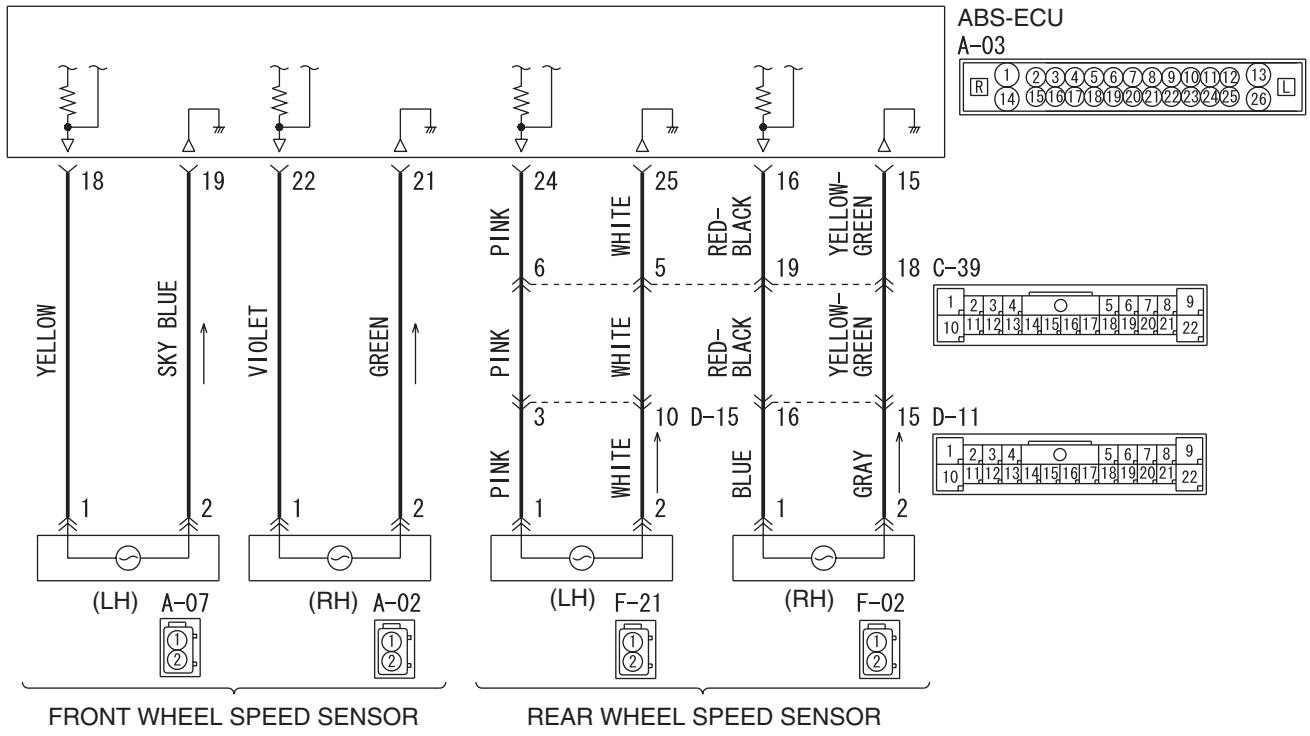
*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1011 set?**

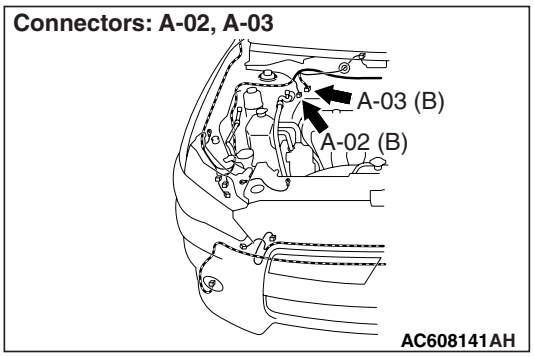
**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C101C Abnormality in FR wheel speed sensor signal

**Wheel Speed Sensor Circuit**




W8G35M000A




**TSB Revision**

⚠ CAUTION

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

## DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Irregular change in the wheel speed sensor signal
- Wheel speed sensor signal continuously indicates higher value than the values of other wheel speed sensors.

## PROBABLE CAUSES

**Current trouble**

- Excessive gap between the wheel speed sensor and the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- Wheel bearing malfunction
- Malfunction of wheel speed sensor
- Damaged wiring harness and connectors
- External noise interference
- Improper installation of the wheel speed sensor
- Deformation of the magnetic encoder for wheel speed detection
- ABS-ECU malfunction
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection
- The number of poles on the magnetic encoder for wheel speed detection (the number of N-pole and S-pole) is changed.

**Past trouble**

- When the diagnostic trouble code No.C1015 is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).
- When diagnostic trouble code No.C1015 is not set, the following conditions may be present:
  - Right or/and left wheels are rotated.
  - Unstable vehicle attitude
  - External noise interference
  - Vehicle ran with the parking brake applied.

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C101C set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check that the diagnostic trouble code No.C100A is also set.

**Q: Is DTC C1015 also set?**

**YES :** Perform the diagnosis for the diagnostic trouble code No.C100A (Refer to P.35B-10).

**NO :** Go to Step 4.

**STEP 4. Check wheel speed sensor installation**

Check how the wheel speed sensor <FR> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

**Q: Is the check result normal?**

**YES :** Go to Step 5.

**NO :** Reinstall the wheel speed sensor correctly.

**STEP 5. Check for wheel speed sensor as a single unit**

**Q: Is the check result normal?**

**YES :** Go to Step 6.
**NO :** Replace the wheel speed sensor.

**STEP 6. Check for wheel bearing looseness**

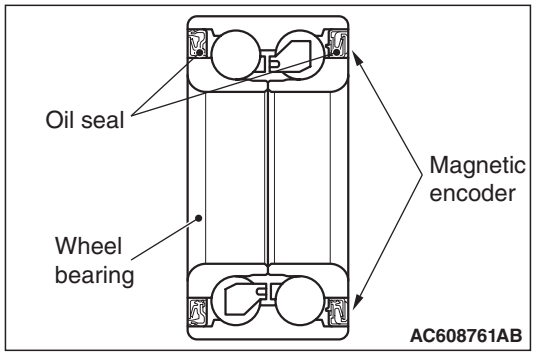
*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FR> for looseness (Refer to GROUP 26 –On-vehicle Service P.26-8).*

**Q: Is the check result normal?**

**YES :** Go to Step 7.
**NO :** Replace the wheel bearing.

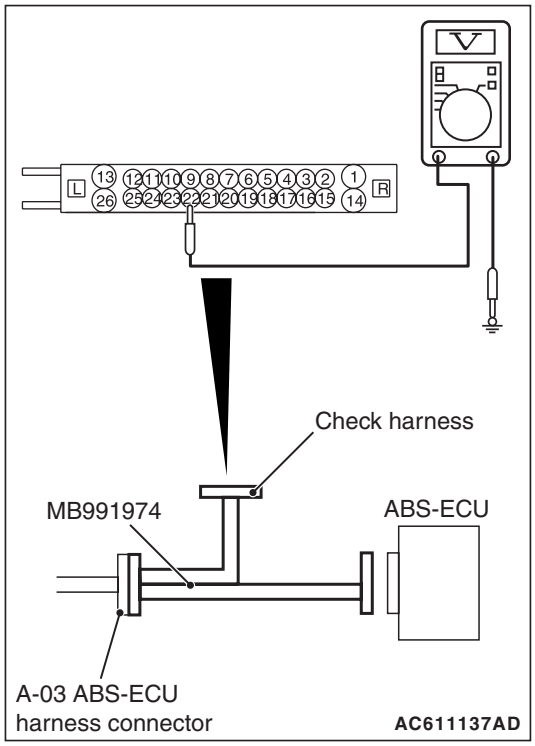
**STEP 7. Check wheel speed detection encoder**

Check the encoder for adhesion of foreign materials or deformation.




**Q: Is the check result normal?**

**YES :** Go to Step 8.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.
**NO (Deformation) :** Replace the wheel bearing.




**STEP 8. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

(3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.22 and body ground, and between the ground terminal No.21 and body ground.

**OK: 1 volt or less**

**Q: Is the check result normal?**

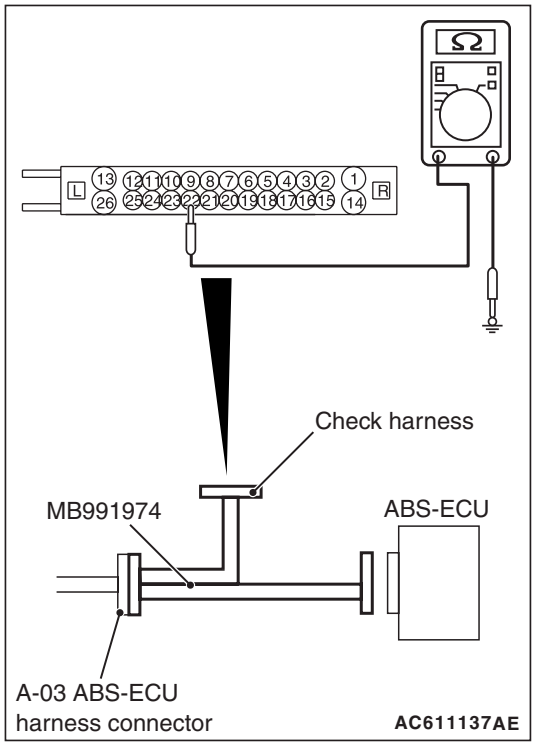
**YES :** Go to Step 9.

**NO (Not normal at the terminal No.22 or 21) :** Go to Step 10.

**STEP 9. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*




(2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No.22 and body ground, and between the ground terminal No.21 and body ground.

**OK: No continuity**

**Q: Is the check result normal?**

**YES :** Go to Step 12.

**NO (Not normal at the terminal No.22 or 21) :** Go to Step 10.

**STEP 10. Connector check: A-03 ABS-ECU connector, A-02 wheel speed sensor <FR> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 11.

**NO :** Repair the defective connector.

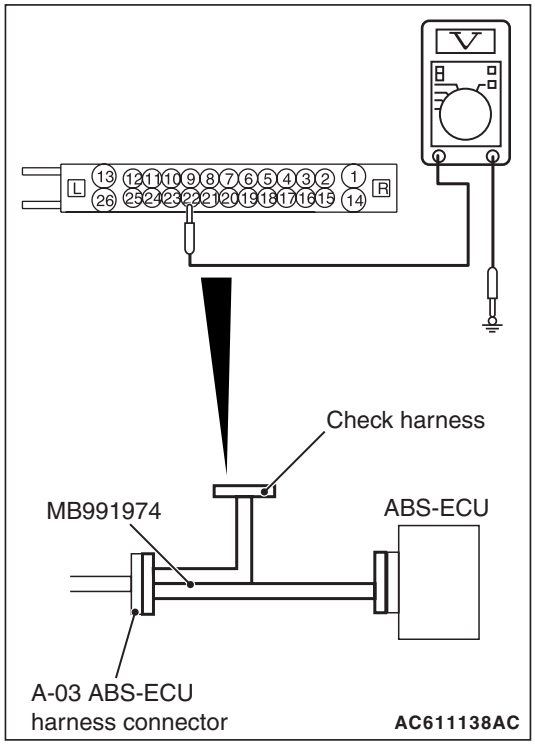
**STEP 11. Wiring harness check between A-03 ABS-ECU connector terminal No.22 and A-02 wheel speed sensor <FR> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.21 and A-02 wheel speed sensor <FR> connector terminal No.2.**

- Check for short circuit in wheel speed sensor <FR> circuit

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor <FR>.

**NO :** Repair the wiring harness.




**STEP 12. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No.22 and body ground.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 13.
**NO :** Go to Step 15.

**STEP 13. Connector check: A-03 ABS-ECU connector, A-02 wheel speed sensor <FR> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 14.
**NO :** Repair the defective connector.

**STEP 14. Wiring harness check between A-03 ABS-ECU connector terminal No.22 and A-02 wheel speed sensor <FR> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.21 and A-02 wheel speed sensor <FR> connector terminal No.2.**

- Check for open circuit in wheel speed sensor <FR> circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 15.
**NO :** Repair the wiring harness.

**STEP 15. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

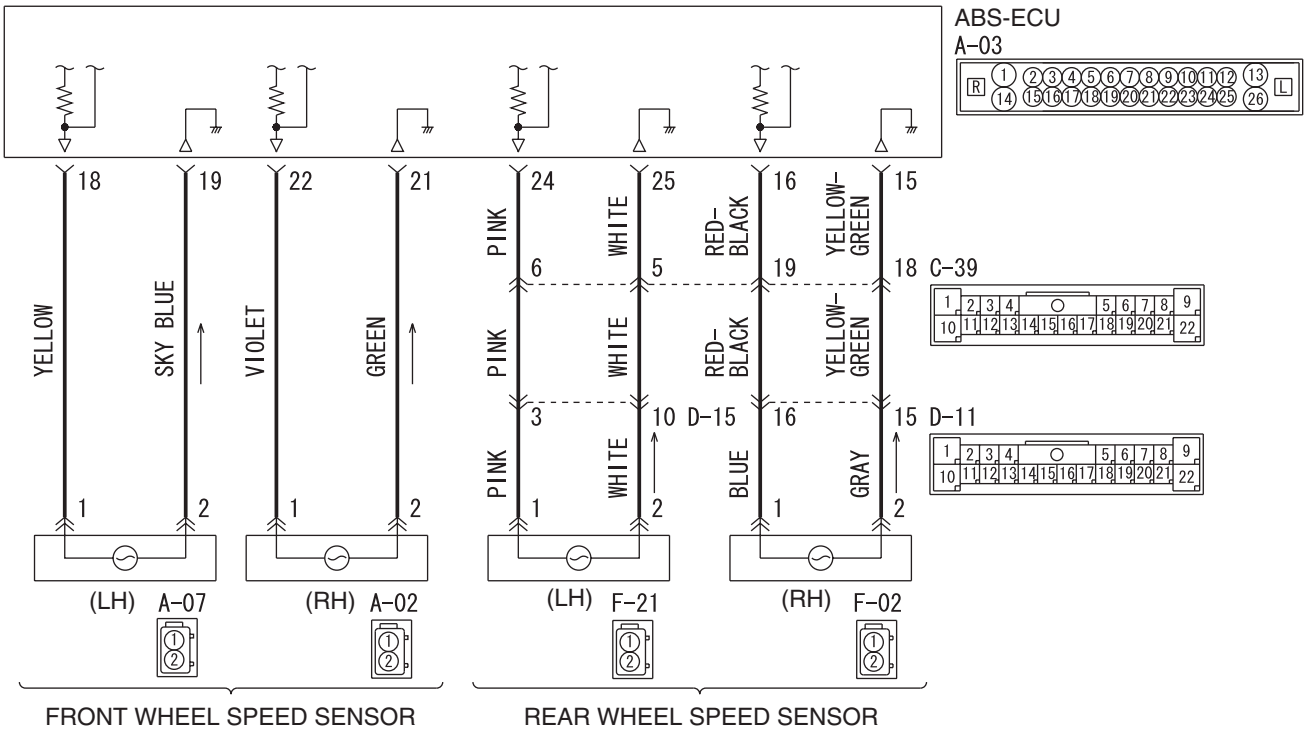
*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C101C set?**

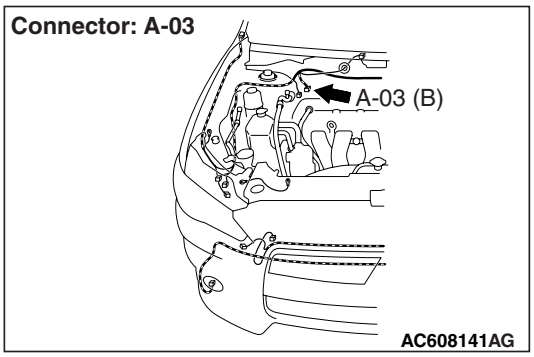
**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

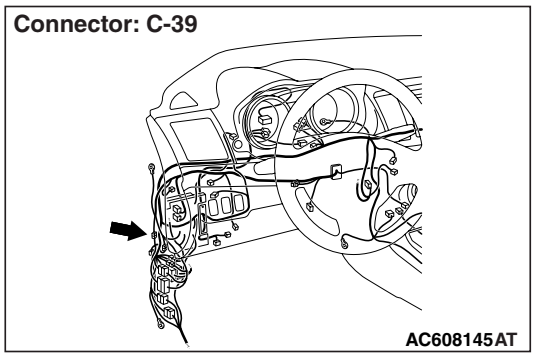
## DTC C1027: Abnormality in RL wheel speed sensor signal

**Wheel Speed Sensor Circuit**

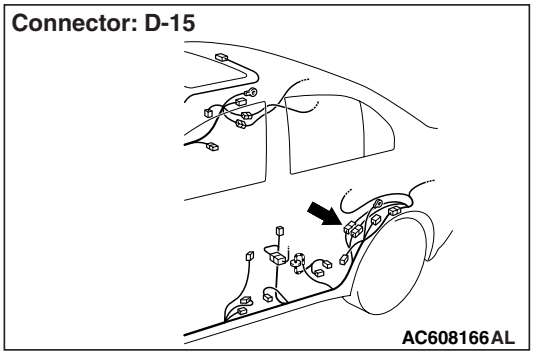


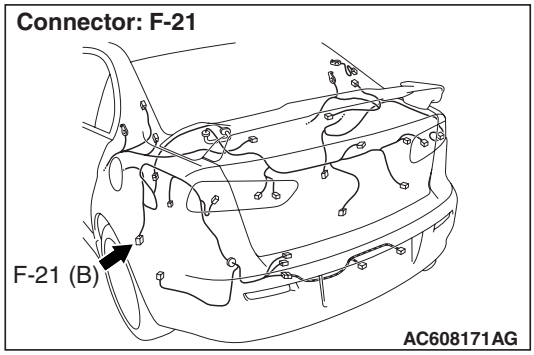

W8G35M000A




**TSB Revision**




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

## DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Irregular change in the wheel speed sensor signal
- Wheel speed sensor signal continuously indicates higher value than the values of other wheel speed sensors.

## PROBABLE CAUSES

**Current trouble**

- Excessive gap between the wheel speed sensor and the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- Wheel bearing malfunction
- Malfunction of wheel speed sensor
- Damaged wiring harness and connectors
- External noise interference
- Improper installation of the wheel speed sensor
- Deformation of the magnetic encoder for wheel speed detection
- ABS-ECU malfunction

**TSB Revision**

- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection
- The number of poles on the magnetic encoder for wheel speed detection (the number of N-pole and S-pole) is changed.

**Past trouble**

- When the diagnostic trouble code No.C1020 is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).
- When the diagnostic trouble code No.C1020 is not set, the following conditions may be present:
  - Right or/and left wheels are rotated.
  - Unstable vehicle attitude
  - External noise interference
  - Vehicle ran with the parking brake applied.

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1027 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check that the diagnostic trouble code C1020 is also set.

**Q: Is DTC C1020 also set?**

**YES :** Perform the diagnosis for the diagnostic trouble code C1020 (Refer to P.35B-20).

**NO :** Go to Step 4.

**STEP 4. Check wheel speed sensor installation**

Check how the wheel speed sensor <RL> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

**Q: Is the check result normal?**

**YES :** Go to Step 5.
**NO :** Reinstall the wheel speed sensor <RL> correctly.

**STEP 5. Check for wheel speed sensor as a single unit**

**Q: Is the check result normal?**

**YES :** Go to Step 6.
**NO :** Replace the wheel speed sensor.

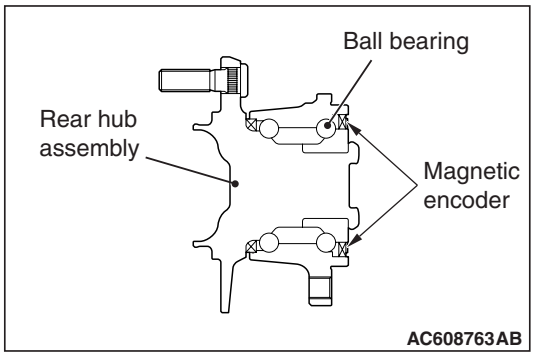
**STEP 6. Check for wheel bearing looseness**

*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RL> for looseness (Refer to GROUP 27 –On-vehicle Service P.27-5).*

**Q: Is the check result normal?**

**YES :** Go to Step 7.
**NO :** Replace the rear wheel hub assembly.

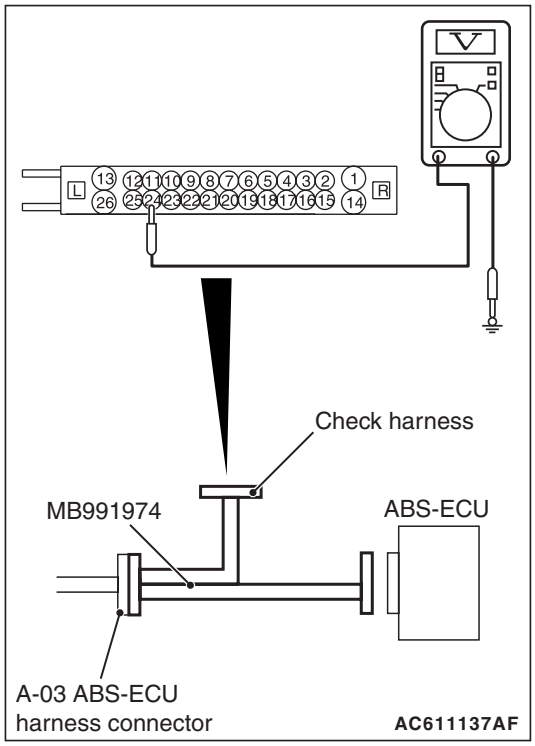
**STEP 7. Check wheel speed detection encoder**




Check the encoder for adhesion of foreign materials or deformation.

**Q: Is the check result normal?**

**YES :** Go to Step 8.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.
**NO (Deformation) :** Replace the rear wheel hub assembly.




**STEP 8. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

(3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.24 and body ground, and between the ground terminal No.25 and body ground.

**OK: 1 volt or less**

**Q: Is the check result normal?**

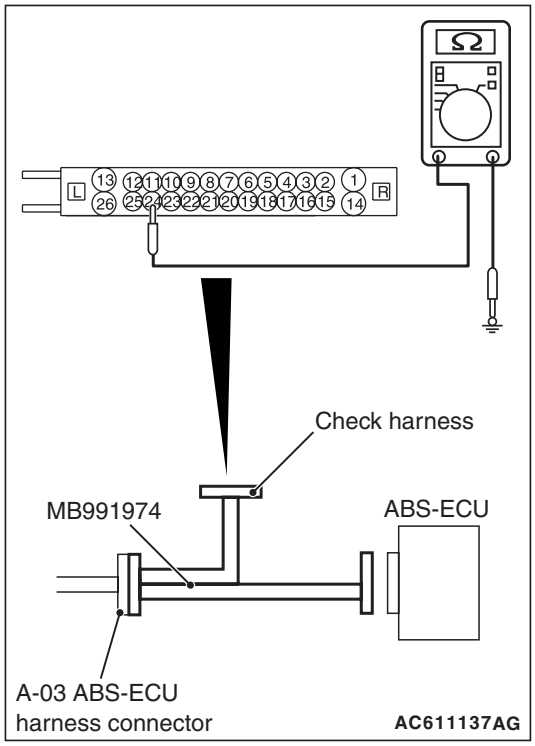
**YES :** Go to Step 9.

**NO (Not normal at the terminal No.24 or 25) :** Go to Step 10.

**STEP 9. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*




(2) Measure the resistance between the wheel speed sensor power supply terminal (signal terminal) No.24 and body ground, and between the ground terminal No.25 and body ground.

**OK: No continuity**

**Q: Is the check result normal?**

**YES :** Go to Step 12.

**NO (Not normal at the terminal No.24 or 25) :** Go to Step 10.

**STEP 10. Connector check: A-03 ABS-ECU connector, C-39 and D-15 intermediate connector, F-21 wheel speed sensor <RL> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 11.

**NO :** Repair the defective connector.

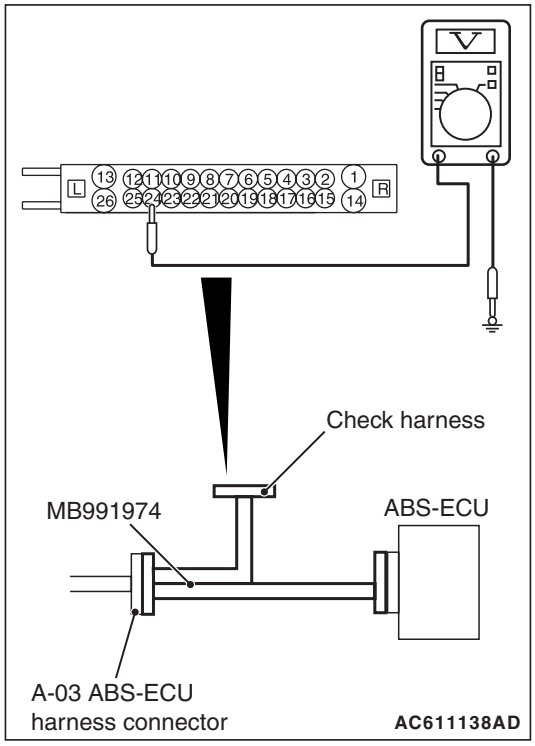
**STEP 11. Wiring harness check between A-03 ABS-ECU connector terminal No.24 and F-21 wheel speed sensor <RL> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.25 and F-21 wheel speed sensor <RL> connector terminal No.2.**

- Check for short circuit in wheel speed sensor <RL> circuit

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor <RL>.

**NO :** Repair the wiring harness.




**STEP 12. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No.24 and body ground.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 13.
**NO :** Go to Step 15.

**STEP 13. Connector check: A-03 ABS-ECU connector, C-39 and D-15 intermediate connector, F-21 wheel speed sensor <RL> connector**

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor.
**NO :** Repair the defective connector.

**STEP 14. Wiring harness check between A-03 ABS-ECU connector terminal No.24 and F-21 wheel speed sensor <RL> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.25 and F-21 wheel speed sensor <RL> connector terminal No.2.2**

- Check for open circuit in wheel speed sensor <RL> circuit

**Q: Is the check result normal?**

**YES :** Go to Step 15.
**NO :** Repair the wiring harness.

**TSB Revision**

**STEP 15. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

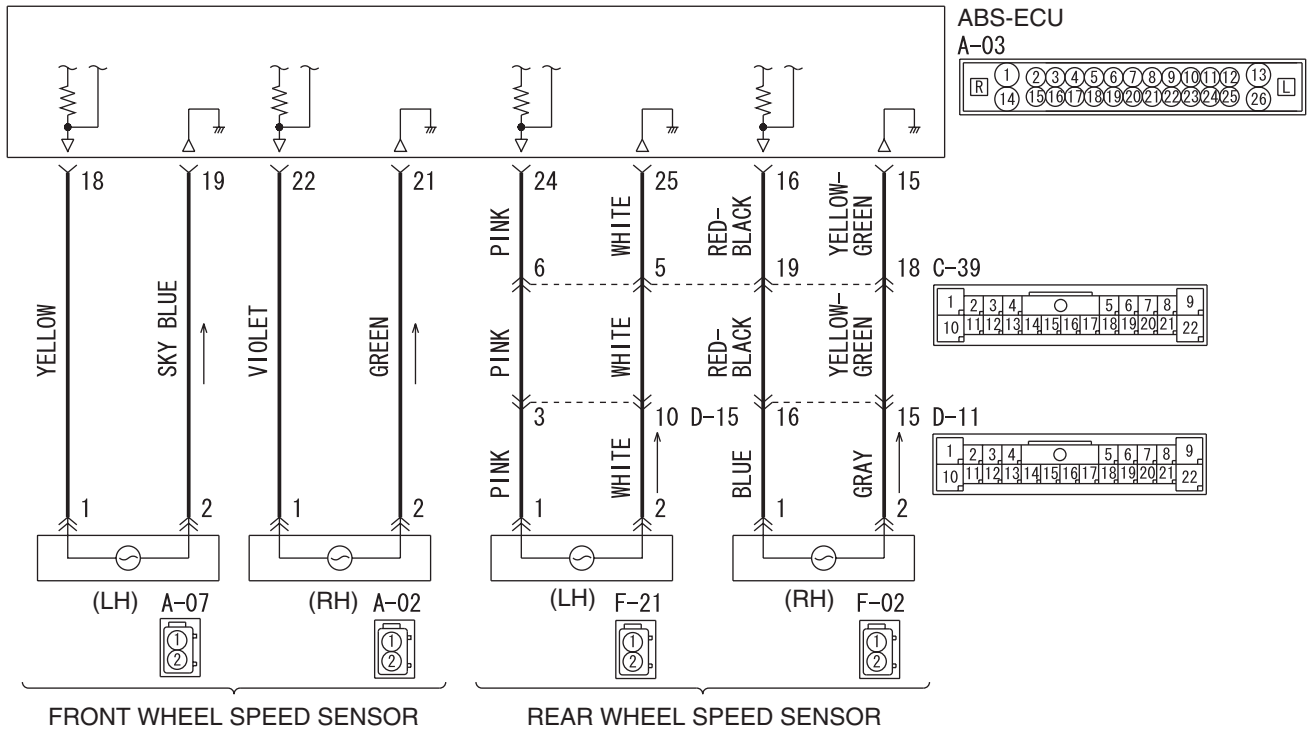
*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1027 set?**

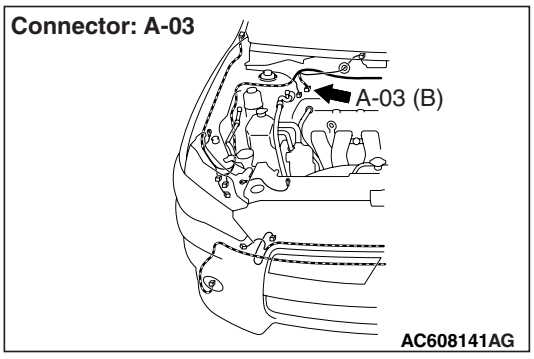
**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

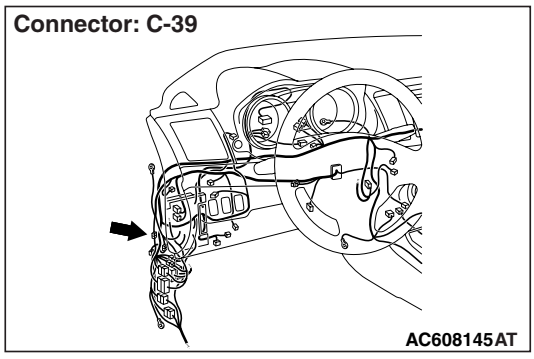
## DTC C1032: Abnormality in RR wheel speed sensor signal

**Wheel Speed Sensor Circuit**

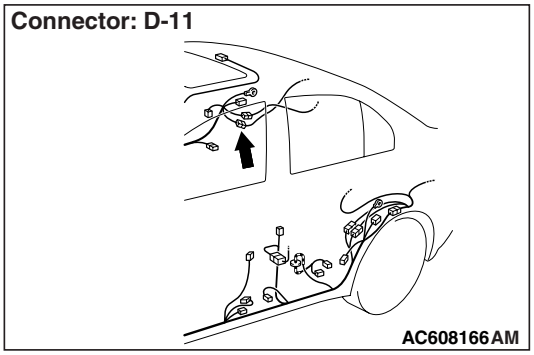


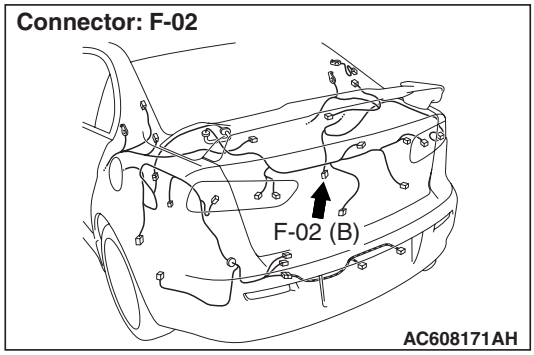

W8G35M000A




**TSB Revision**




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-15).**

## CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

## DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Irregular change in the wheel speed sensor signal
- Wheel speed sensor signal continuously indicates higher value than the values of other wheel speed sensors.

## PROBABLE CAUSES

**Current trouble**

- Excessive gap between the wheel speed sensor and the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- Wheel bearing malfunction
- Malfunction of wheel speed sensor
- Damaged wiring harness and connectors
- External noise interference
- Improper installation of the wheel speed sensor
- Deformation of the magnetic encoder for wheel speed detection
- ABS-ECU malfunction

**TSB Revision**

- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection
- The number of poles on the magnetic encoder for wheel speed detection (the number of N-pole and S-pole) is changed.

**Past trouble**

- When the diagnostic trouble code No.C102B is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).
- When the diagnostic trouble code No.C102B is not set, the following conditions may be present:
  - Right or/and left wheels are rotated.
  - Unstable vehicle attitude
  - External noise interference
  - Vehicle ran with the parking brake applied.

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, then go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1032 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check that the diagnostic trouble code C102B is also set.

**Q: Is DTC C102B also set?**

**YES :** Perform the diagnosis for the diagnostic trouble code No.C102B (Refer to P.35B-26).

**NO :** Go to Step 4.

**STEP 4. Check wheel speed sensor installation**

Check how the wheel speed sensor <RR> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

**Q: Is the check result normal?**

**YES :** Go to Step 5.
**NO :** Reinstall the wheel speed sensor correctly.

**STEP 5. Check for wheel speed sensor as a single unit**

**Q: Is the check result normal?**

**YES :** Go to Step 6.
**NO :** Replace the wheel speed sensor.

**STEP 6. Check for wheel bearing looseness**

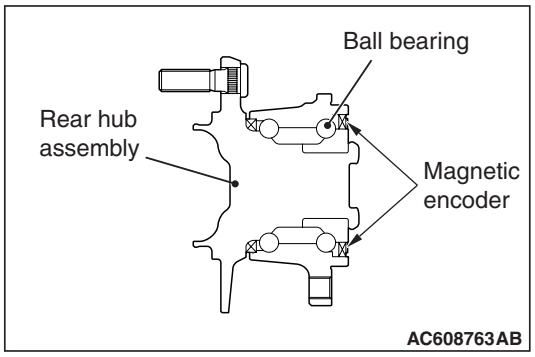
*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RR> for looseness (Refer to GROUP 27 –On-vehicle Service P.27-5).*

**Q: Is the check result normal?**

**YES :** Go to Step 7.
**NO :** Replace the rear wheel hub assembly.

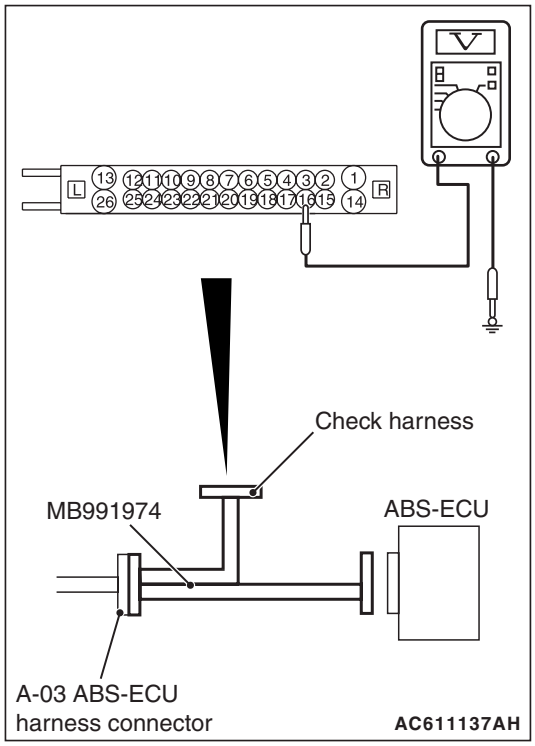
**STEP 7. Check wheel speed detection encoder**

Check the encoder for adhesion of foreign materials or deformation.




**Q: Is the check result normal?**

**YES :** Go to Step 8.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.
**NO (Deformation) :** Replace the rear wheel hub assembly.




**STEP 8. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

(3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.16/the ground terminal No.15 and body ground.

**OK: 1 volt or less**

**Q: Is the check result normal?**

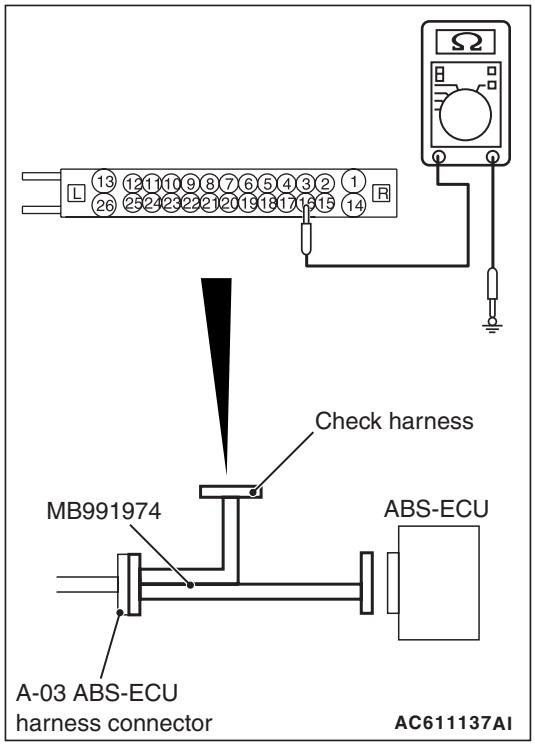
**YES :** Go to Step 9.

**NO (Not normal at terminal No.16 or 15) :** Go to Step 10.

**STEP 9. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*




(2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No.16/the ground terminal No.15 and body ground

**OK: No continuity**

**Q: Is the check result normal?**

**YES :** Go to Step 12.
**NO (Not normal at terminal No.16 or 15) :** Go to Step 10.

**STEP 10. Connector check: A-03 ABS-ECU connector, C-39 and D-11 intermediate connector, F-02 wheel speed sensor <RR> connector**

**Q: Is the check result normal?**

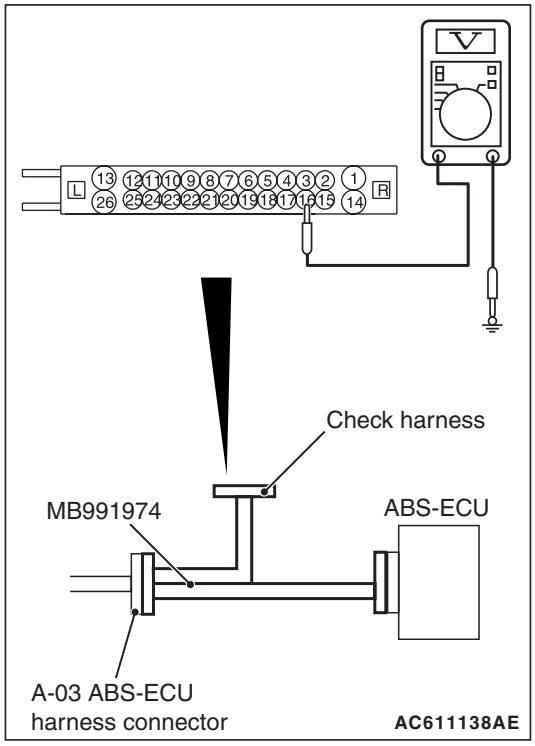
**YES :** Go to Step 11.
**NO :** Repair the defective connector.

**STEP 11. Wiring harness check between A-03 ABS-ECU connector terminal No.16 and F-02 wheel speed sensor <RR> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.15 and F-02 wheel speed sensor <RR> connector terminal No.2.**

- Check for short circuit in wheel speed sensor <RR> circuit

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor <RR>.
**NO :** Repair the wiring harness.




**STEP 12. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No.16 and body ground.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 13.
**NO :** Go to Step 15.

**STEP 13. Connector check: A-03 ABS-ECU connector, C-39 and D-11 intermediate connector, F-02 wheel speed sensor <RR> connector**

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor.
**NO :** Repair the defective connector.

**STEP 14. Wiring harness check between A-03 ABS-ECU connector terminal No.16/15 and F-02 wheel speed sensor <RR> connector terminal No.1/2**

- Check for open circuit in wheel speed sensor <RR> circuit

**Q: Is the check result normal?**

**YES :** Go to Step 15.
**NO :** Repair the wiring harness.

**STEP 15. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1032 set?**

**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C1014: Mutual monitoring of FL wheel speed sensor

**⚠ CAUTION**
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

### DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Missing wheel speed sensor signal
- Wheel speed sensor signal continuously indicates lower value than the values of other wheel speed sensors.

### PROBABLE CAUSES

**Current trouble**

- Excessive gap between the wheel speed sensor and the magnetic encoder for wheel speed detection
- Wheel bearing malfunction
- Deformation of the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection

**TSB Revision**

- Malfunction of wheel speed sensor
- Improper installation of the wheel speed sensor
- ABS-ECU malfunction
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection
- The number of poles on the magnetic encoder for wheel speed detection (the number of N-pole and S-pole) is changed.

**Past trouble**

- When the diagnostic trouble code C100A is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).
- When the diagnostic trouble code C100A is not set, the following conditions may be present:
  - Some wheels slip.
  - Unstable vehicle attitude
  - External noise interference
  - Vehicle ran with the parking brake applied.
  - Only two wheels are rotated on a drum tester.

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1014 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check that the diagnostic trouble code C100A is also set.

**Q: Is DTC C100A also set?**

**YES :** Perform the diagnosis for the diagnostic trouble code C100A (Refer to P.35B-10).

**NO :** Go to Step 4.

**STEP 4. Check wheel speed sensor installation**
Check how the wheel speed sensor <FL> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

**Q: Is the check result normal?**

**YES :** Go to Step 5.
**NO :** Reinstall the wheel speed sensor correctly.

**STEP 5. Check for wheel speed sensor as a single unit**
Refer to P.35B-173.

**Q: Is the check result normal?**

**YES :** Go to Step 6.
**NO :** Replace the wheel speed sensor.

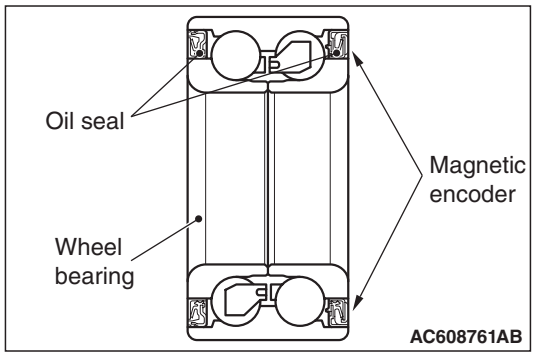
**STEP 6. Check for wheel bearing looseness**

*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FL> for looseness (Refer to GROUP 26 –On-vehicle Service P.26-8).*

**Q: Is the check result normal?**

**YES :** Go to Step 7.
**NO :** Replace the wheel bearing.

**STEP 7. Check wheel speed detection encoder**
Check the encoder for adhesion of foreign materials or deformation.




**Q: Is the check result normal?**

**YES :** Go to Step 8.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.
**NO (Deformation) :** Replace the wheel bearing.

**STEP 8. Check whether the diagnostic trouble code is reset.**
(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1014 set?**

**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C101F Mutual monitoring of FR wheel speed sensor

**⚠ CAUTION**
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines. (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

### DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Missing wheel speed sensor signal
- Wheel speed sensor signal continuously indicates lower value than the values of other wheel speed sensors.

### PROBABLE CAUSES

**Current trouble**

- Excessive gap between the wheel speed sensor and the magnetic encoder for wheel speed detection
- Wheel bearing malfunction
- Deformation of the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- Malfunction of wheel speed sensor
- Improper installation of the wheel speed sensor
- ABS-ECU malfunction
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection
- The number of poles on the magnetic encoder for wheel speed detection (the number of N-pole and S-pole) is changed.

**Past trouble**

- When the diagnostic trouble code C1015 is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).
- When diagnostic trouble code C1015 is not set, the following conditions may be present:
  - Some wheels slip.
  - Unstable vehicle attitude
  - External noise interference
  - Vehicle ran with the parking brake applied.
  - Only two wheels are rotated on a drum tester.

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C101F set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check that the diagnostic trouble code C1015 is also set.

**Q: Is DTC C1015 also set?**

**YES :** Perform the diagnosis for the diagnostic trouble code No. C1015 (Refer to P.35B-15).

**NO :** Go to Step 4.

**STEP 4. Check wheel speed sensor installation**

Check how the wheel speed sensor <FR> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

**Q: Is the check result normal?**

**YES :** Go to Step 5.

**NO :** Reinstall the wheel speed sensor correctly.

**STEP 5. Check for wheel speed sensor as a single unit**

**Q: Is the check result normal?**

**YES :** Go to Step 6.
**NO :** Replace the wheel speed sensor.

**STEP 6. Check for wheel bearing looseness**

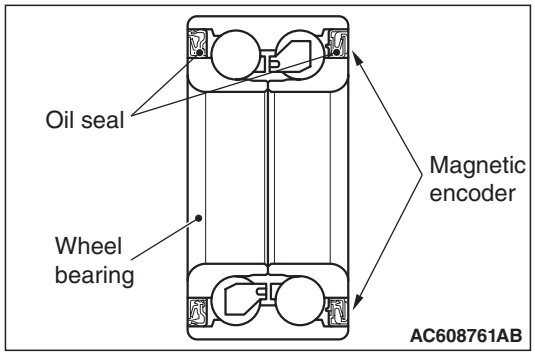
*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FR> for looseness (Refer to GROUP 26 –On-vehicle Service P.26-8).*

**Q: Is the check result normal?**

**YES :** Go to Step 7.
**NO :** Replace the wheel bearing.

**STEP 7. Check wheel speed detection encoder**

Check the encoder for adhesion of foreign materials or deformation.




**Q: Is the check result normal?**

**YES :** Go to Step 8.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.
**NO (Deformation) :** Replace the wheel bearing.

**STEP 8. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C101F set?**

**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC No. C102A: Mutual monitoring of RL wheel speed sensor

⚠ CAUTION
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

### DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Missing wheel speed sensor signal
- Wheel speed sensor signal continuously indicates lower value than the values of other wheel speed sensors.

### PROBABLE CAUSES

**Current trouble**

- Excessive gap between the wheel speed sensor and the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the wheel speed sensor
- Wheel bearing malfunction
- Deformation of the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- Malfunction of wheel speed sensor
- Improper installation of the wheel speed sensor
- ABS-ECU malfunction
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection
- The number of poles on the magnetic encoder for wheel speed detection (the number of N-pole and S-pole) is changed.

**Past trouble**

- When the diagnostic trouble code C1020 is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).
- When the diagnostic trouble code C1020 is not set, the following conditions may be present:
  - Some wheels slip.
  - Unstable vehicle attitude
  - External noise interference
  - Vehicle ran with the parking brake applied.
  - Only two wheels are rotated on a drum tester.

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C102A set?**

**YES :** Go to Step 3.
**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check that the diagnostic trouble code C1020 is also set.

**Q: Is DTC C1020 also set?**

**YES :** Perform the diagnosis for the diagnostic trouble code C1020 (Refer to P.35B-20).
**NO :** Go to Step 4.

**STEP 4. Check wheel speed sensor installation**

Check how the wheel speed sensor <RL> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

**Q: Is the check result normal?**

**YES :** Go to Step 5.
**NO :** Reinstall the wheel speed sensor correctly.

**STEP 5. Check for wheel speed sensor as a single unit**
Refer to P.35B-173.

**Q: Is the check result normal?**

**YES :** Go to Step 6.
**NO :** Replace the wheel speed sensor.

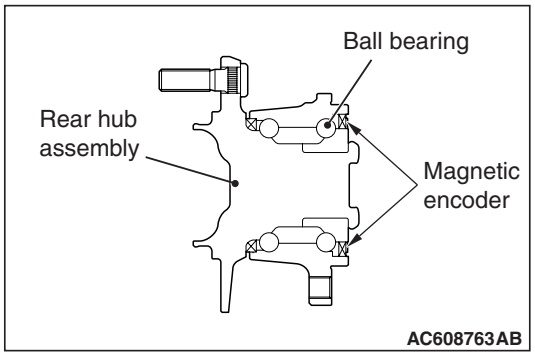
**STEP 6. Check for wheel bearing looseness**

*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RL> for looseness (Refer to GROUP 27 –On-vehicle Service P.27-5).*

**Q: Is the check result normal?**

**YES :** Go to Step 7.
**NO :** Replace the rear wheel hub assembly.

**STEP 7. Check wheel speed detection encoder**
Check the encoder for adhesion of foreign materials or deformation.




**Q: Is the check result normal?**

**YES :** Go to Step 8.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.
**NO (Deformation) :** Replace the rear wheel hub assembly.

**STEP 8. Check whether the diagnostic trouble code is reset.**
(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C102A set?**

**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C1035: Mutual monitoring of RR wheel speed sensor

**⚠ CAUTION**
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

### DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any fault below is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

- Missing wheel speed sensor signal
- Wheel speed sensor signal continuously indicates lower value than the values of other wheel speed sensors.

### PROBABLE CAUSES

**Current trouble**

- Excessive gap between the wheel speed sensor and the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the wheel speed sensor
- Wheel bearing malfunction
- Deformation of the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- Malfunction of wheel speed sensor
- Improper installation of the wheel speed sensor
- ABS-ECU malfunction
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection
- The number of poles on the magnetic encoder for wheel speed detection (the number of N-pole and S-pole) is changed.

**Past trouble**

- When the diagnostic trouble code C102B is also set, carry out diagnosis with particular emphasis on wiring harness and connector failures between ABS-ECU and the wheel speed sensor. For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).
- When the diagnostic trouble code C102B is not set, the following conditions may be present:
  - Some wheels slip.
  - Unstable vehicle attitude
  - External noise interference
  - Vehicle ran with the parking brake applied.
  - Only two wheels are rotated on a drum tester.

## DIAGNOSIS

**Required Special Tools:**

- MB991958 Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827 M.U.T.-III USB Cable
  - MB991910 M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1035 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check that the diagnostic trouble code C102B is also set.

**Q: Is DTC C102B also set?**

**YES :** Perform the diagnosis for the diagnostic trouble code C102B (Refer to P.35B-26).

**NO :** Go to Step 4.

**STEP 4. Check wheel speed sensor installation**

Check how the wheel speed sensor <RR> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

**Q: Is the check result normal?**

**YES :** Go to Step 5.

**NO :** Reinstall the wheel speed sensor correctly.

**STEP 5. Check for wheel speed sensor as a single unit**
Refer to P.35B-173.

**Q: Is the check result normal?**

**YES :** Go to Step 6.
**NO :** Replace the wheel speed sensor.

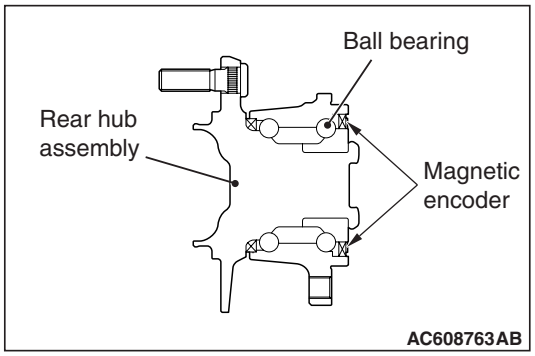
**STEP 6. Check for wheel bearing looseness**

*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RL> for looseness (Refer to GROUP 27 –On-vehicle Service P.27-5).*

**Q: Is the check result normal?**

**YES :** Go to Step 7.
**NO :** Replace the rear wheel hub assembly.

**STEP 7. Check wheel speed detection encoder**
Check the encoder for adhesion of foreign materials or deformation.




**Q: Is the check result normal?**

**YES :** Go to Step 8.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.
**NO (Deformation) :** Replace the rear wheel hub assembly.

**STEP 8. Check whether the diagnostic trouble code is reset.**
(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1035 set?**

**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C1041: Abnormality in periodical signal for FL wheel speed sensor

⚠ CAUTION
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

### DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any periodical drop is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

### PROBABLE CAUSES

- Wheel bearing malfunction
- Deformation of the magnetic encoder for wheel speed detection
- Missing teeth of the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- ABS-ECU malfunction
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection

### DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**
Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**
**YES :** Go to Step 3.
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

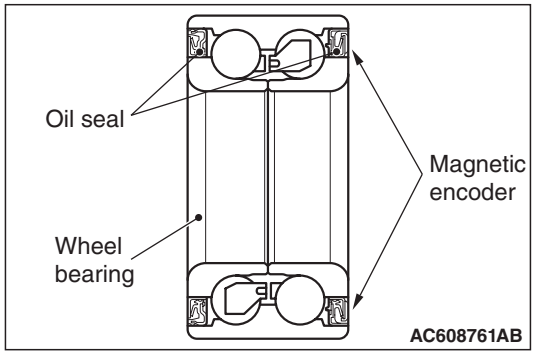
**Q: Is DTC C1041 set?**
**YES :** Go to Step 3.
**NO :** The procedure is complete.

**STEP 3. Check for wheel bearing looseness**

*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FL> for looseness (Refer to GROUP 26 –On-vehicle Service P.26-8).*

**Q: Is the check result normal?**
**YES :** Go to Step 4.
**NO :** Replace the wheel bearing.

**STEP 4. Check wheel speed detection encoder**
Check the encoder for adhesion of foreign materials or deformation.




**Q: Is the check result normal?**
**YES :** Go to Step 5.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction. When the encoder is deformed, replace the wheel bearing.
**NO (Deformation) :** Replace the wheel bearing.

**STEP 5. Check whether the diagnostic trouble code is reset.**
(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1041 set?**
**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C1042: Abnormality in periodical signal for FR wheel speed sensor

⚠ CAUTION
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ASC-ECU. ASC-ECU uses the frequency of the pulse signals to determine the wheel speed.

### DTC SET CONDITIONS

ASC-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any periodical drop is found in these sensor signals, ASC-ECU will set the relevant diagnostic trouble code.

### PROBABLE CAUSES

- Wheel bearing malfunction
- Deformation of the magnetic encoder for wheel speed detection
- Missing teeth of the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- ASC-ECU malfunction
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection

### DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**
Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**
**YES :** Go to Step 3.
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

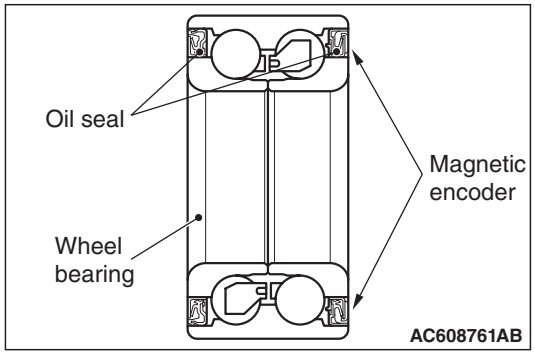
**Q: Is DTC C1042 set?**
**YES :** Go to Step 3.
**NO :** The procedure is complete.

**STEP 3. Check for wheel bearing looseness**

*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FR> for looseness (Refer to GROUP 26 –On-vehicle Service P.26-8).*

**Q: Is the check result normal?**
**YES :** Go to Step 4.
**NO :** Replace the wheel bearing.

**STEP 4. Check wheel speed detection encoder**
Check the encoder for adhesion of foreign materials or deformation.




**Q: Is the check result normal?**
**YES :** Go to Step 5.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction. When the encoder is deformed, replace the wheel bearing.
**NO (Deformation) :** Replace the wheel bearing.

**STEP 5. Check whether the diagnostic trouble code is reset.**
(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1042 set?**
**YES :** Replace the ASC-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C1043: Abnormality in periodical signal for RL wheel speed sensor

⚠ CAUTION
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

### DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any periodical drop is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

### PROBABLE CAUSES

- Wheel bearing malfunction
- Deformation of the magnetic encoder for wheel speed detection
- Missing teeth of the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- ABS-ECU malfunction
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection

### DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**
Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**
**YES :** Go to Step 3.
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

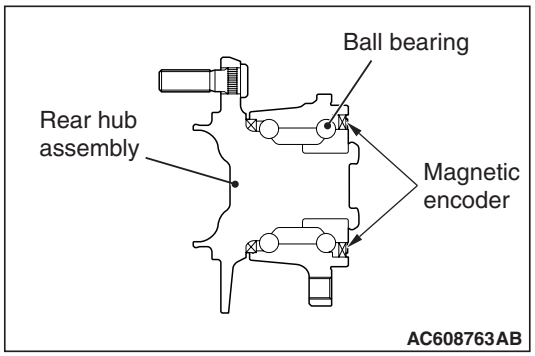
**Q: Is DTC C1043 set?**
**YES :** Go to Step 3.
**NO :** The procedure is complete.

**STEP 3. Check for wheel bearing looseness**

*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RL> for looseness (Refer to GROUP 27 –On-vehicle Service P.27-5).*

**Q: Is the check result normal?**
**YES :** Go to Step 4.
**NO :** Replace the rear wheel hub assembly.

**STEP 4. Check wheel speed detection encoder**
Check the encoder for adhesion of foreign materials or deformation.




**Q: Is the check result normal?**
**YES :** Go to Step 5.
**NO (Presence of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction. When the encoder is deformed, replace the rear hub assembly.
**NO (Deformation) :** Replace the rear wheel hub assembly.

**STEP 5. Check whether the diagnostic trouble code is reset.**
(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1043 set?**
**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C1044: Abnormality in periodical signal for RR wheel speed sensor

⚠ CAUTION
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

### DTC SET CONDITIONS

ABS-ECU monitors the signals from each wheel speed sensor while the vehicle is being driven. If any periodical drop is found in these sensor signals, ABS-ECU will set the relevant diagnostic trouble code.

### PROBABLE CAUSES

- Wheel bearing malfunction
- Deformation of the magnetic encoder for wheel speed detection
- Missing teeth of the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- ABS-ECU malfunction
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection

### DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1044 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. Check for wheel bearing looseness**

*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RR> for looseness (Refer to GROUP 27 –On-vehicle Service P.27-5).*

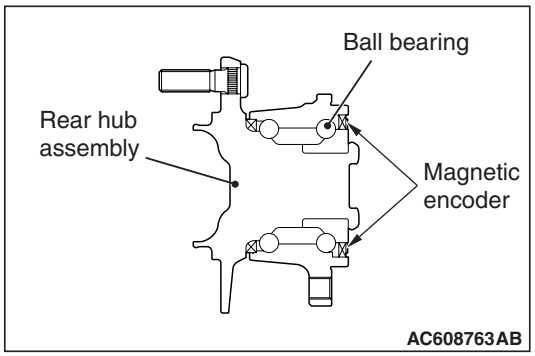
**Q: Is the check result normal?**

**YES :** Go to Step 4.

**NO :** Replace the rear wheel hub assembly.

**STEP 4. Check wheel speed detection encoder**

Check the encoder for adhesion of foreign materials or deformation.




**Q: Is the check result normal?**

**YES :** Go to Step 5.

**NO (Presence of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction. When the encoder is deformed, replace the rear hub assembly.

**NO (Deformation) :** Replace the rear wheel hub assembly.

**STEP 5. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.

(2) Drive the vehicle at 12mph (20 km/h) or more.

*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

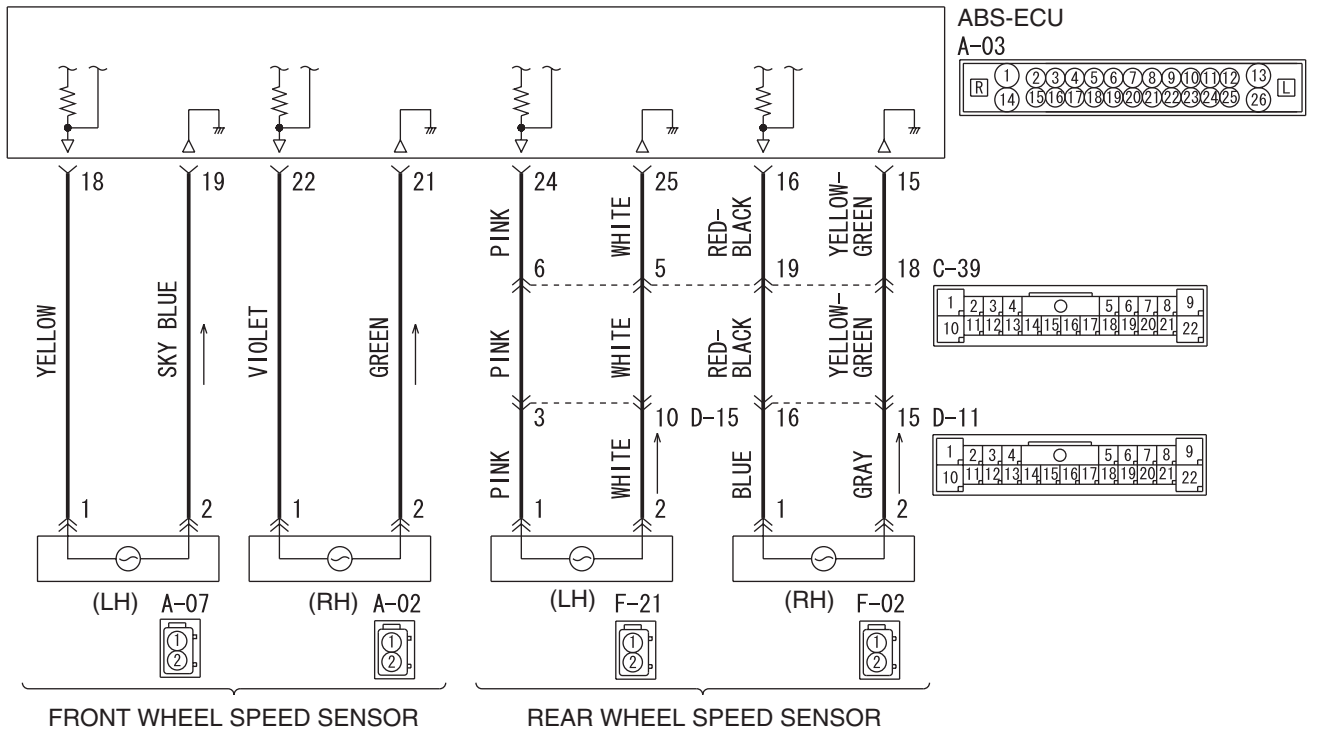
**Q: Is DTC C1044 set?**

**YES :** Replace the ABS-ECU.

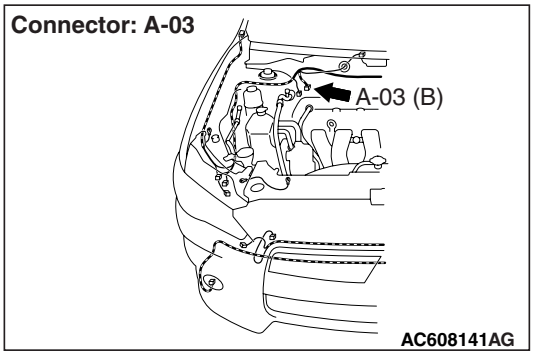
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

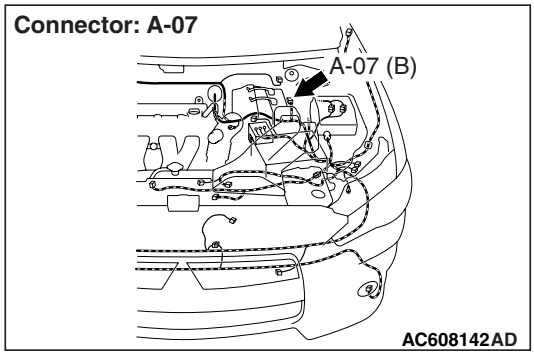
## DTC C1046: FL wheel speed sensor control phase time exceeded

**Wheel Speed Sensor Circuit**




W8G35M000A




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.

**TSB Revision**

- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

## DTC SET CONDITIONS

This diagnostic trouble code is set if any malfunction below is found:

- When the brake fluid pressure is decreased for a long time.
- When the brake fluid pressure is held for a long time.

## PROBABLE CAUSES

- Damaged wiring harness and connectors
- External noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction
- Excessive gap between the wheel speed sensor and the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- Wheel bearing malfunction
- Improper installation of the wheel speed sensor
- Deformation of the magnetic encoder for wheel speed detection
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection
- Missing teeth of the magnetic encoder for wheel speed detection

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1046 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check that the diagnostic trouble codes C100A, C1011, C1014, and C1041 are also set.

**Q: Are DTC C100A, C1011, C1014, and C1041 also set?**

**YES :** Carry out the diagnosis for the relevant diagnostic trouble codes, and then go to Step 5.

**NO :** Go to Step 4.

**STEP 4. M.U.T.-III data list**

Check the following service data (Refer to P.35B-164).

- Item No.01: FL wheel speed sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

**NO :** Go to Step 5.

**STEP 5. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

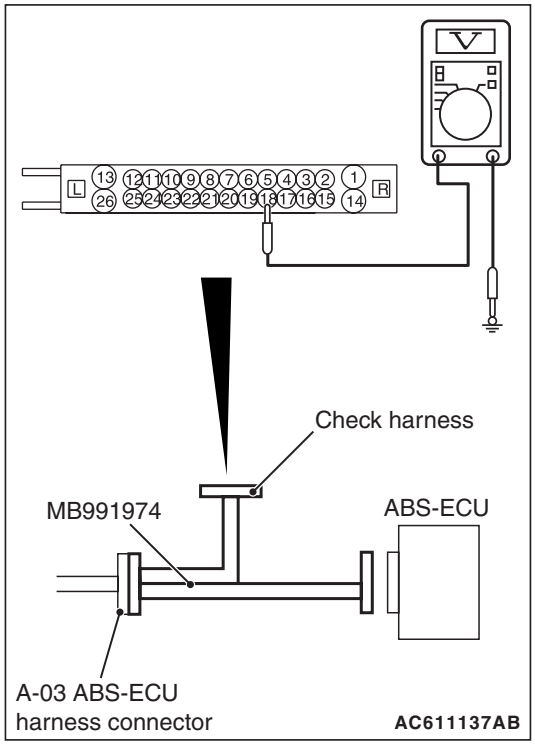
(3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.18 and body ground, and between the ground terminal No.19 and body ground.

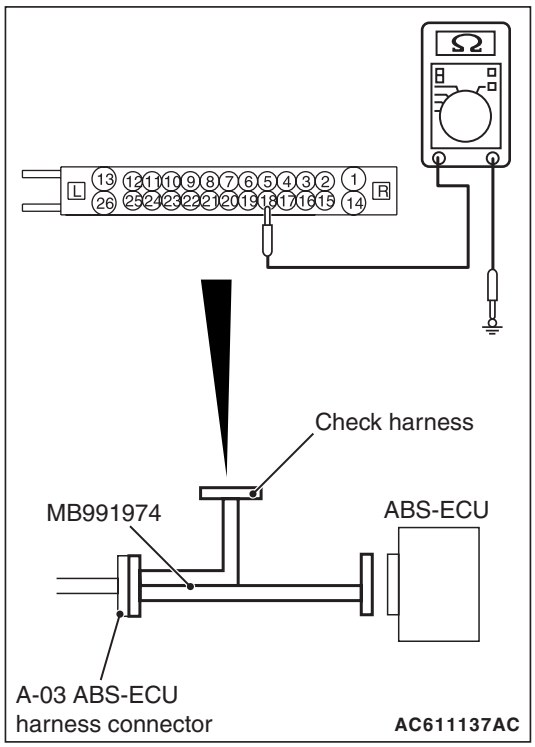
**OK: 1 volt or less**

**Q: Is the check result normal?**

**YES :** Go to Step 6.

**NO (Not normal at the terminal No.18 or 19) :** Go to Step 7.






**STEP 6. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No.18 and body ground, and between the ground terminal No.19 and body ground.

**OK: No continuity**

**Q: Is the check result normal?**

**YES :** Go to Step 9.

**NO (Not normal at the terminal No.18 or 19) :** Go to Step 7.

**STEP 7. Connector check: A-03 ABS-ECU connector, A-07 wheel speed sensor <FL> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 8.

**NO :** Repair the defective connector.

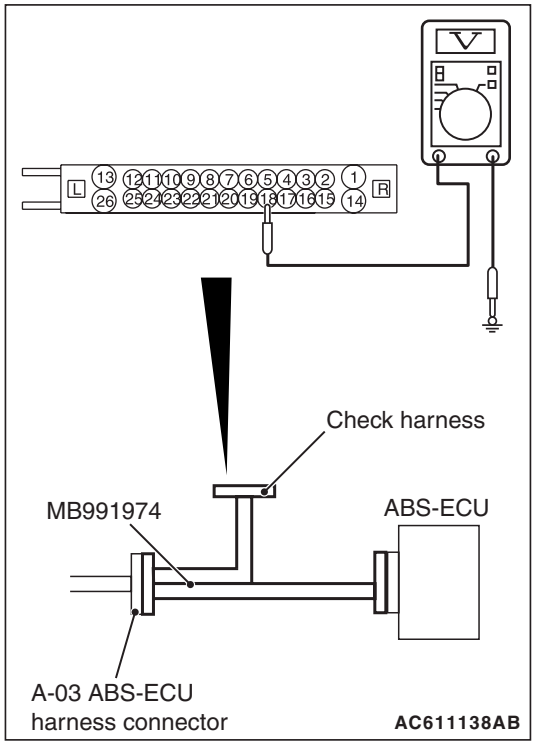
**STEP 8. Wiring harness check between A-03 ABS-ECU connector terminal No.18 and A-07 wheel speed sensor <FL> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.19 and A-07 wheel speed sensor <FL> connector terminal No.2.**

- Check for short circuit in wheel speed sensor <FL> circuit

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor <FL>.

**NO :** Repair the wiring harness.




**STEP 9. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No.18 and body ground.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Go to Step 12.

**STEP 10. Wiring harness check between A-03 ABS-ECU connector terminal No.18 and A-07 wheel speed sensor <FL> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.19 and A-07 wheel speed sensor <FL> connector terminal No.2.**

- Check for open circuit in wheel speed sensor <FL> circuit

**Q: Is the check result normal?**

**YES :** Go to Step 11.
**NO :** Repair the wiring harness.

**STEP 11. Check for wheel speed sensor as a single unit**

Refer to P.35B-173.

**Q: Is the check result normal?**

**YES :** Go to Step 13.
**NO :** Replace the wheel speed sensor.

**STEP 12. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** Go to Step 16.
**NO :** Repair the defective connector.

**TSB Revision**

**STEP 13. Check for wheel speed sensor installation**

Check how the wheel speed sensor <FL> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

**Q: Is the check result normal?**

**YES :** Go to Step 14.
**NO :** Reinstall the wheel speed sensor correctly.

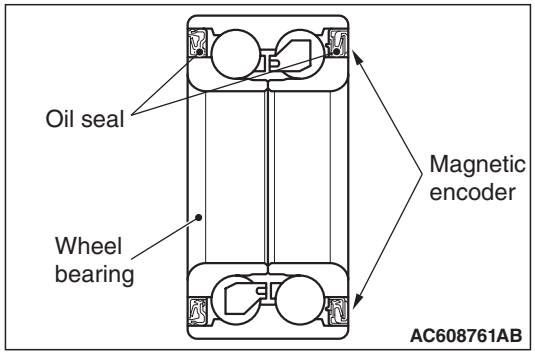
**STEP 14. Check for wheel bearing looseness**

*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FL> for looseness (Refer to GROUP 26 –On-vehicle Service P.26-8).*

**Q: Is the check result normal?**

**YES :** Go to Step 15.
**NO :** Replace the wheel bearing.

**STEP 15. Check of wheel speed detection encoder**




Check the encoder for adhesion of foreign materials or deformation.

**Q: Is the check result normal?**

**YES :** Go to Step 16.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.
**NO (Deformation) :** Replace the wheel bearing.

**STEP 16. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

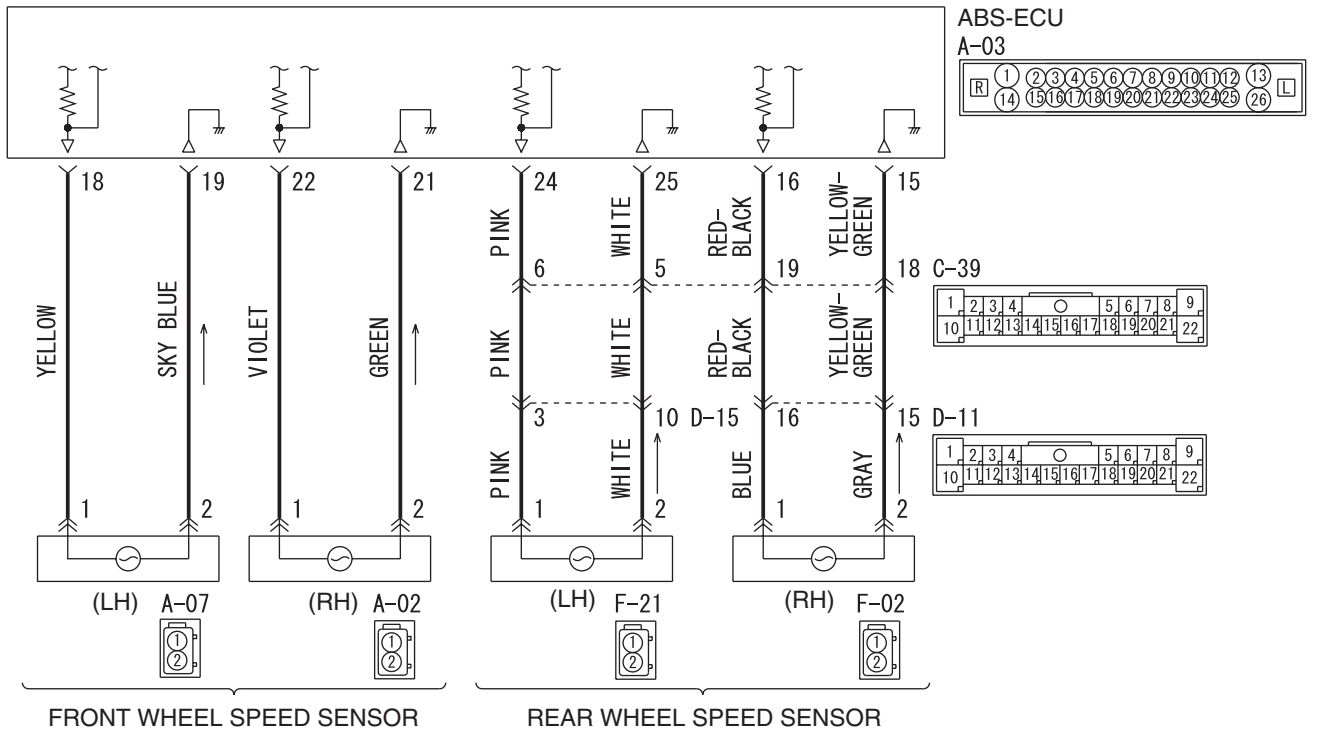
*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1046 set?**

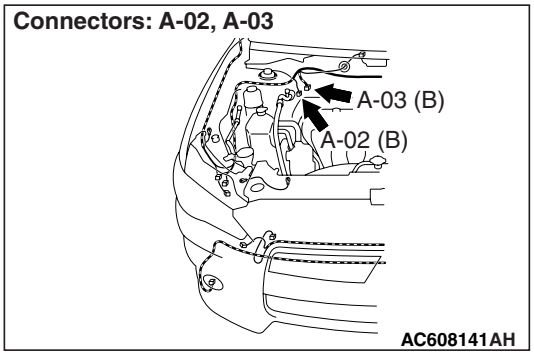
**YES :** Replace the ABS-ECU.
**NO :** The procedure is complete.

## DTC C1047: FR wheel speed sensor control phase time exceeded

**Wheel Speed Sensor Circuit**




W8G35M000A




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.

**TSB Revision**

- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

## DTC SET CONDITIONS

This diagnostic trouble code is set if any malfunction below is found:

- When the brake fluid pressure is decreased for a long time.
- When the brake fluid pressure is held for a long time.

## PROBABLE CAUSES

- Damaged wiring harness and connectors
- External noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction
- Excessive gap between the wheel speed sensor and the wheel speed detection encoder
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the wheel speed detection encoder
- Wheel bearing malfunction
- Improper installation of the wheel speed sensor
- Deformation of the wheel speed detection encoder
- Disturbance of magnetization pattern for wheel speed detection encoder
- Missing teeth of the wheel speed detection encoder

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1047 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check that the diagnostic trouble codes C1015, C101C, C101F, and C1042 are also set.

**Q: Are DTC C1015, C101C, C101F, and C1042 also set?**

**YES :** Carry out the diagnosis for the relevant diagnostic trouble codes, and then go to Step 5.

**NO :** Go to Step 4.

**STEP 4. M.U.T.-III data list**

Check the following service data (Refer to P.35B-164).

- Item No.02: FR wheel speed sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

**NO :** Go to Step 5.

**STEP 5. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

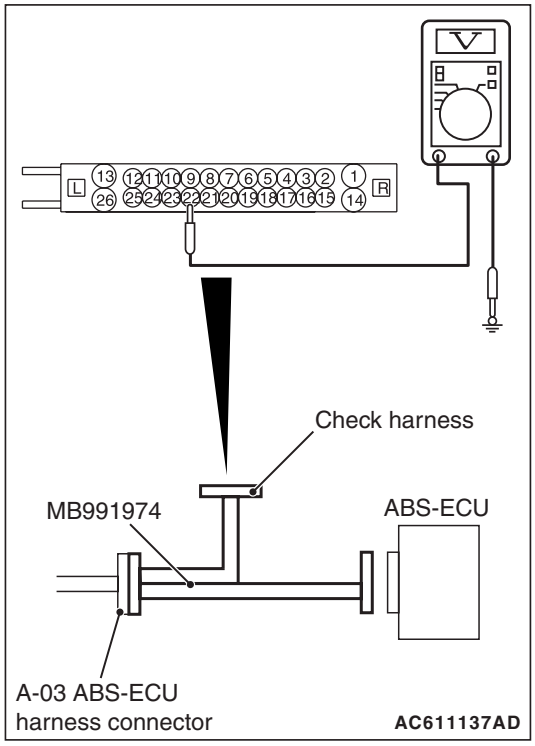
(3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.22 and body ground, and between the ground terminal No.21 and body ground.

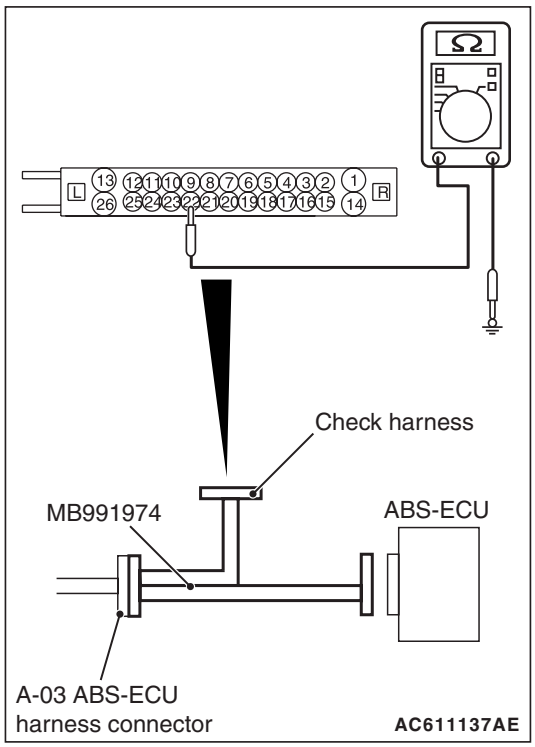
**OK: 1 volt or less**

**Q: Is the check result normal?**

**YES :** Go to Step 6.

**NO (Not normal at the terminal No.22 or 21) :** Go to Step 7.






**STEP 6. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No.22 and body ground, and between the ground terminal No.21 and body ground.

**OK: No continuity**

**Q: Is the check result normal?**

**YES :** Go to Step 9.

**NO (Not normal at the terminal No.22 or 21) :** Go to Step 7.

**STEP 7. Connector check: A-03 ABS-ECU connector, A-02 wheel speed sensor <FR> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 8.

**NO :** Repair the defective connector.

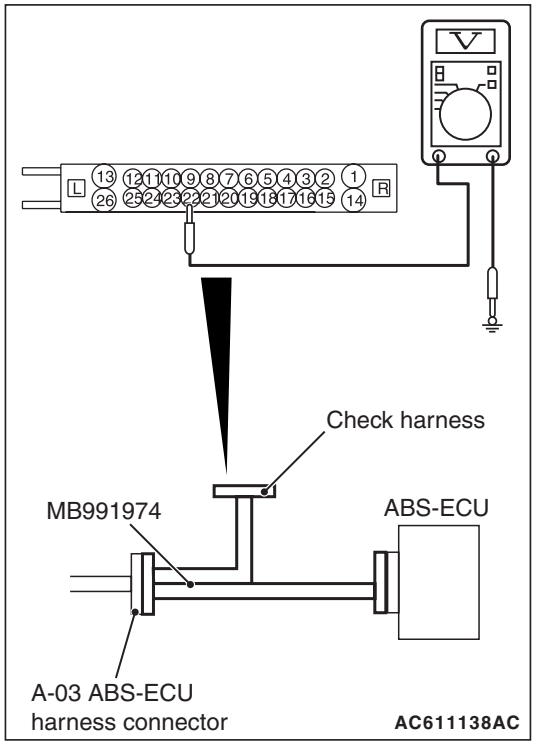
**STEP 8. Wiring harness check between A-03 ABS-ECU connector terminal No.22 and A-02 wheel speed sensor <FR> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.21 and A-02 wheel speed sensor <FR> connector terminal No.2.**

- Check for short circuit in wheel speed sensor <FR> circuit

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor <FR>.

**NO :** Repair the wiring harness.




**STEP 9. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No.22 and body ground.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Go to Step 12.

**STEP 10. Wiring harness check between A-03 ABS-ECU connector terminal No.22 and A-02 wheel speed sensor <FR> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.21 and A-02 wheel speed sensor <FR> connector terminal No.2.**

- Check for open circuit in wheel speed sensor <FR> circuit

**Q: Is the check result normal?**

**YES :** Go to Step 11.
**NO :** Repair the wiring harness.

**STEP 11. Check for wheel speed sensor as a single unit**

Refer to P.35B-173.

**Q: Is the check result normal?**

**YES :** Go to Step 13.
**NO :** Replace the wheel speed sensor.

**STEP 12. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** Go to Step 16.
**NO :** Repair the defective connector.

**TSB Revision**

**STEP 13. Check for wheel speed sensor installation**

Check how the wheel speed sensor <FR> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

**Q: Is the check result normal?**

**YES :** Go to Step 14.
**NO :** Reinstall the wheel speed sensor correctly.

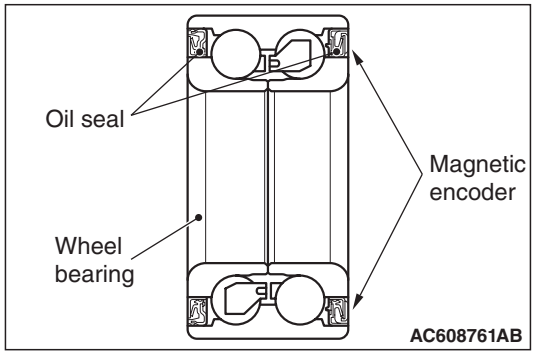
**STEP 14. Check for wheel bearing looseness**

*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <FR> for looseness (Refer to GROUP 26 –On-vehicle Service P.26-8).*

**Q: Is the check result normal?**

**YES :** Go to Step 15.
**NO :** Replace the wheel bearing.

**STEP 15. Check of wheel speed detection encoder**




Check the encoder for adhesion of foreign materials or deformation.

**Q: Is the check result normal?**

**YES :** Go to Step 16.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.
**NO (Deformation) :** Replace the wheel bearing.

**STEP 16. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

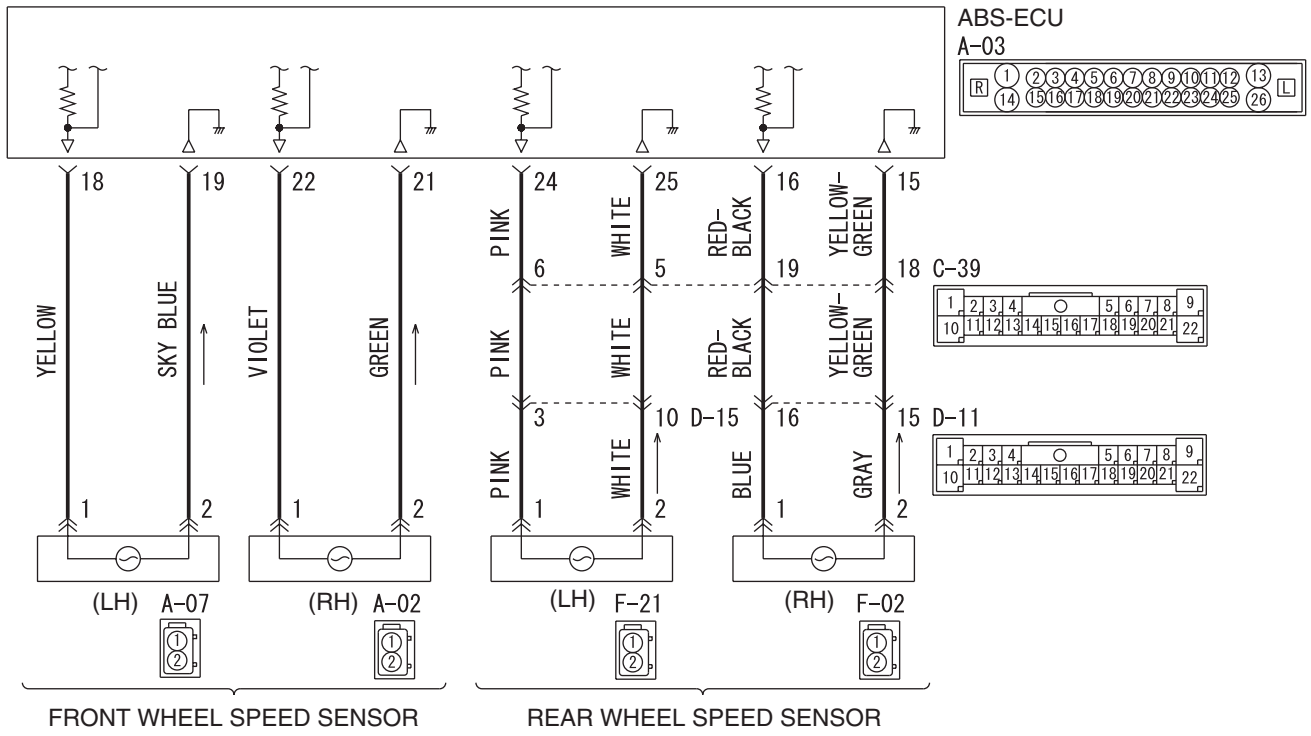
*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1047 set?**

**YES :** Replace the ABS-ECU.
**NO :** The procedure is complete.

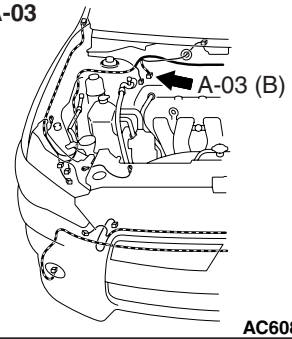
## DTC C1048: RL wheel speed sensor control phase time exceeded

**Wheel Speed Sensor Circuit**



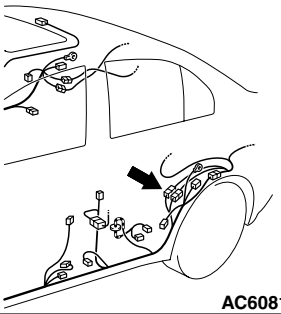

W8G35M000A

**Connector: A-03**



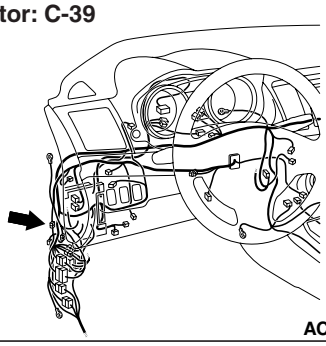

AC608141AG

**Connector: D-15**



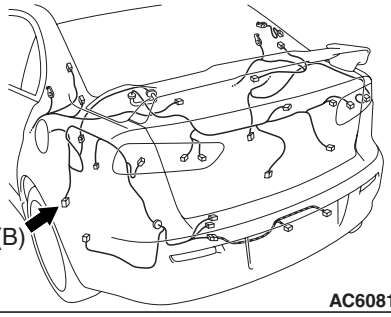
AC608166AL

**Connector: C-39**



AC608145AT

**Connector: F-21**




AC608171AG

**TSB Revision**

⚠ CAUTION
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

## DTC SET CONDITIONS

This diagnostic trouble code is set if any malfunction below is found:

- When the brake fluid pressure is decreased for a long time.
- When the brake fluid pressure is held for a long time.

## PROBABLE CAUSES

- Damaged wiring harness and connectors
- External noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction
- Excessive gap between the wheel speed sensor and the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- Wheel bearing malfunction
- Improper installation of the wheel speed sensor
- Deformation of the magnetic encoder for wheel speed detection
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection
- Missing teeth of the magnetic encoder for wheel speed detection

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1048 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check that the diagnostic trouble codes C1020, C1027, C102A, and C1043 are also set.

**Q: Are DTC C1020, C1027, C102A, and C1043 also set?**

**YES :** Carry out the diagnosis for the relevant diagnostic trouble codes, and then go to Step 5.

**NO :** Go to Step 4.

**STEP 4. M.U.T.-III data list**

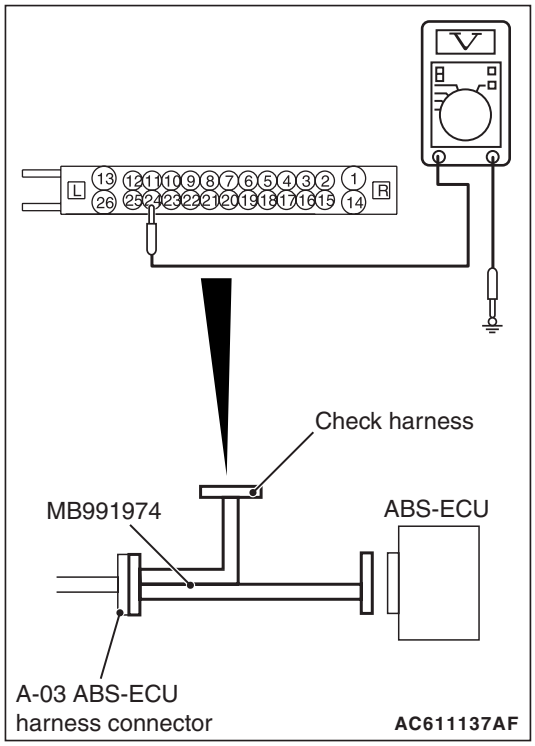
Check the following service data (Refer to P.35B-164).

- Item No.03: RL wheel speed sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

**NO :** Go to Step 5.




**STEP 5. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

(3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.24 and body ground, and between the ground terminal No.25 and body ground.

**OK: 1 volt or less**

**Q: Is the check result normal?**

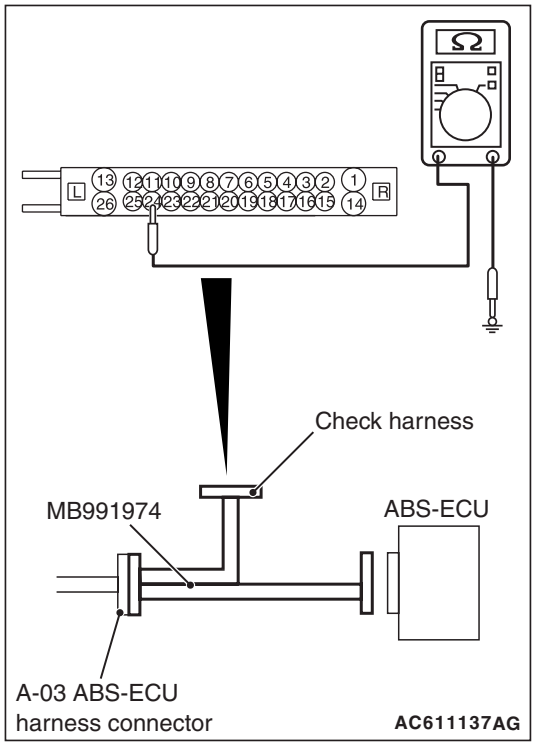
**YES :** Go to Step 6.

**NO (Not normal at the terminal No.24 or 25) :** Go to Step 7.

**STEP 6. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*




(2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No.24 and body ground, and between the ground terminal No.25 and body ground.

**OK: No continuity**

**Q: Is the check result normal?**

**YES :** Go to Step 9.

**NO (Not normal at the terminal No.24 or 25) :** Go to Step 7.

**STEP 7. Connector check: A-03 ABS-ECU connector, C-39 and D-15 intermediate connector, F-21 wheel speed sensor <RL> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 8.

**NO :** Repair the defective connector.

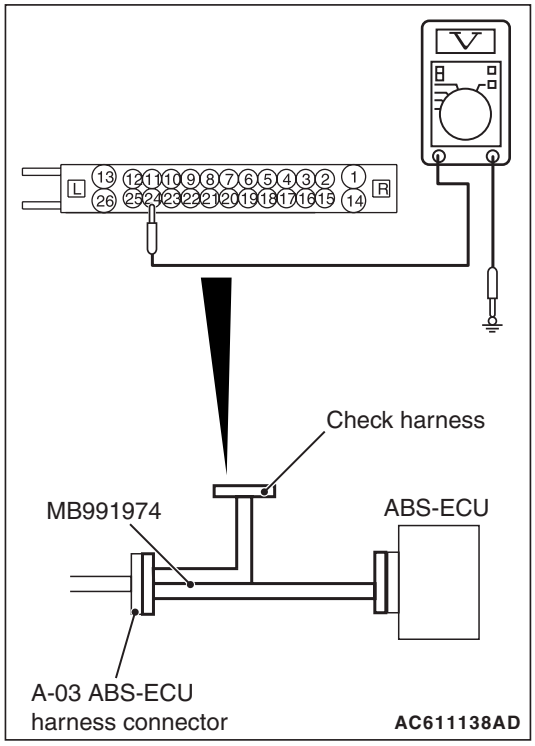
**STEP 8. Wiring harness check between A-03 ABS-ECU connector terminal No.24 and F-21 wheel speed sensor <RL> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.25 and F-21 wheel speed sensor <RL> connector terminal No.2.**

- Check for short circuit in wheel speed sensor <RL> circuit

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor <RL>.

**NO :** Repair the wiring harness.




**STEP 9. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No.24 and body ground.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Go to Step 12.

**STEP 10. Wiring harness check between A-03 ABS-ECU connector terminal No.24 and F-21 wheel speed sensor <RL> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.25 and F-21 wheel speed sensor <RL> connector terminal No.2.**

- Check for open circuit in wheel speed sensor <RL> circuit

**Q: Is the check result normal?**

**YES :** Go to Step 11.
**NO :** Repair the wiring harness.

**STEP 11. Check for wheel speed sensor as a single unit**

Refer to P.35B-173.

**Q: Is the check result normal?**

**YES :** Go to Step 13.
**NO :** Replace the wheel speed sensor.

**STEP 12. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** Go to Step 16.
**NO :** Repair the defective connector.

**TSB Revision**

**STEP 13. Check for wheel speed sensor installation**

Check how the wheel speed sensor <RL> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

**Q: Is the check result normal?**

**YES :** Go to Step 14.
**NO :** Reinstall the wheel speed sensor correctly.

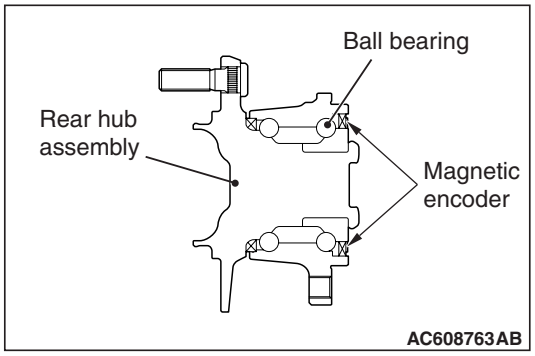
**STEP 14. Check for wheel bearing looseness**

*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RL> for looseness (Refer to GROUP 27 –On-vehicle Service P.27-5).*

**Q: Is the check result normal?**

**YES :** Go to Step 15.
**NO :** Replace the rear wheel hub assembly.

**STEP 15. Check of wheel speed detection encoder**




Check the encoder for adhesion of foreign materials or deformation.

**Q: Is the check result normal?**

**YES :** Go to Step 16.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.
**NO (Deformation) :** Replace the rear wheel hub assembly.

**STEP 16. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

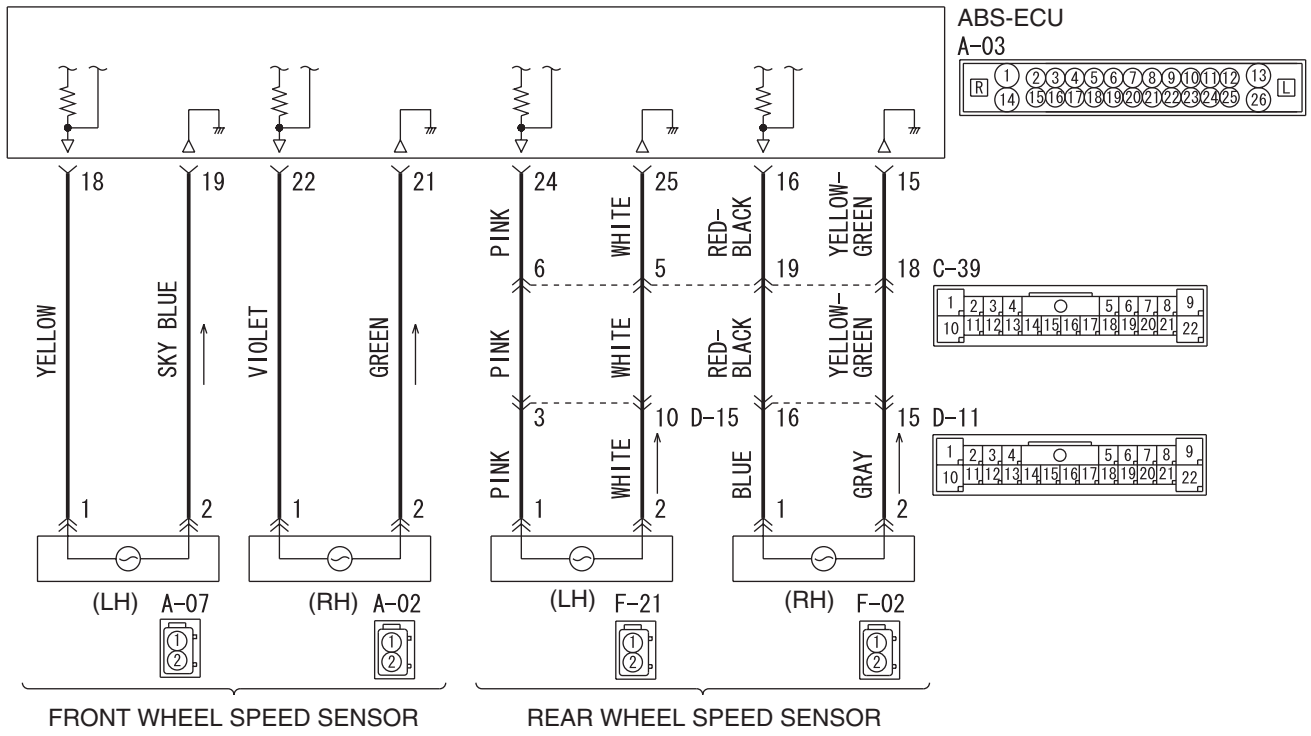
*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1048 set?**

**YES :** Replace the ABS-ECU.
**NO :** The procedure is complete.

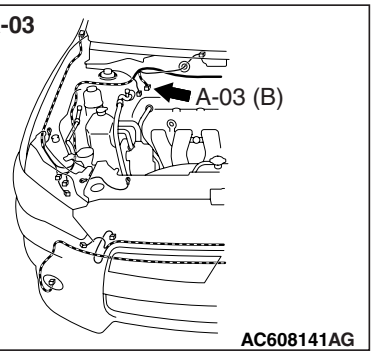
## DTC C1049: RR wheel speed sensor control phase time exceeded

**Wheel Speed Sensor Circuit**



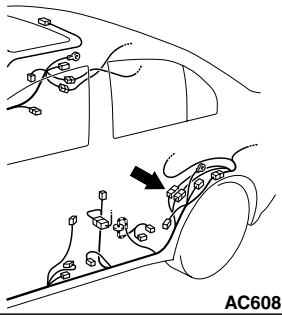

W8G35M000A

**Connector: A-03**



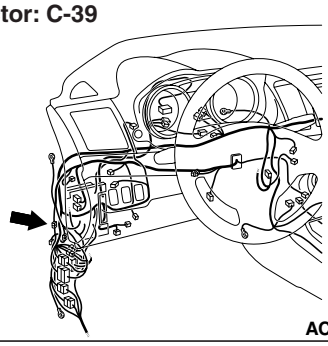

AC608141AG

**Connector: D-15**



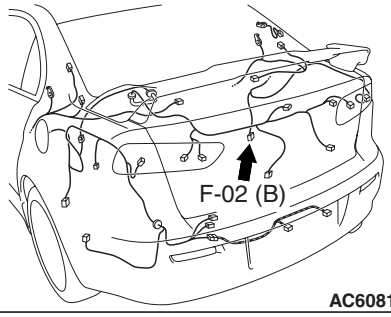
AC608166AL

**Connector: C-39**



AC608145AT

**Connector: F-02**




AC608171AH

**TSB Revision**

⚠ CAUTION
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## CIRCUIT OPERATION

- The wheel speed sensor is a type of pulse generator. It consists of encoders (a plate on which north and south pole sides of the magnets are arranged alternately) for detecting the wheel speed which rotates at the same speed of the wheels and wheel speed sensors. This sensor outputs frequency pulse signals in proportion to the wheel speed.
- The pulse signals, which the wheel speed sensor creates, are sent to ABS-ECU. ABS-ECU uses the frequency of the pulse signals to determine the wheel speed.

## DTC SET CONDITIONS

This diagnostic trouble code is set if any malfunction below is found:

- When the brake fluid pressure is decreased for a long time.
- When the brake fluid pressure is held for a long time.

## PROBABLE CAUSES

- Damaged wiring harness and connectors
- External noise interference
- Malfunction of wheel speed sensor
- ABS-ECU malfunction
- Excessive gap between the wheel speed sensor and the magnetic encoder for wheel speed detection
- Adhesion of foreign materials on the wheel speed sensor
- Adhesion of foreign materials on the magnetic encoder for wheel speed detection
- Wheel bearing malfunction
- Improper installation of the wheel speed sensor
- Deformation of the magnetic encoder for wheel speed detection
- Disturbance of magnetization pattern for magnetic encoder for wheel speed detection
- Missing teeth of the magnetic encoder for wheel speed detection

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991816: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54D – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1049 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check that the diagnostic trouble codes C102B, C1032, C1035, and C1044 are also set.

**Q: Are DTC C102B, C1032, C1035, and C1044 also set?**

**YES :** Carry out the diagnosis for the relevant diagnostic trouble codes, and then go to Step 5.

**NO :** Go to Step 4.

**STEP 4. M.U.T.-III data list**

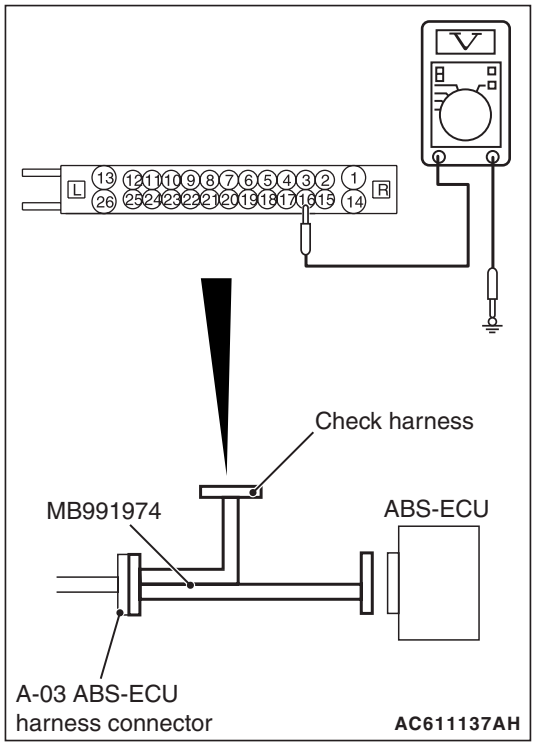
Check the following service data (Refer to P.35B-164).

- Item No.04: RR wheel speed sensor

**Q: Is the check result normal?**

**YES :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

**NO :** Go to Step 5.




**STEP 5. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

(3) Measure the voltage between the wheel speed sensor power supply terminal (signal terminal) No.16 and body ground, and between the ground terminal No.15 and body ground.

**OK: 1 volt or less**

**Q: Is the check result normal?**

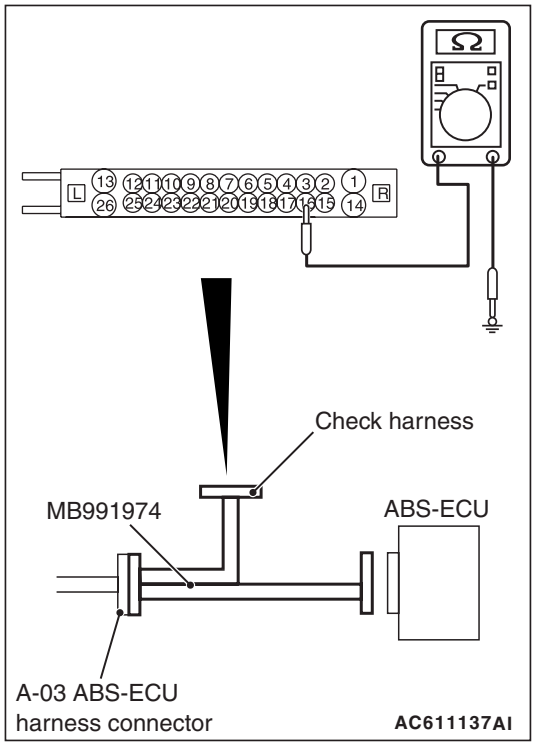
**YES :** Go to Step 6.

**NO (Not normal at the terminal No.16 or 15) :** Go to Step 7.

**STEP 6. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the harness-side connector, and then measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*




(2) Resistance between the wheel speed sensor power supply terminal (signal terminal) No.16 and body ground, and between the ground terminal No.15 and body ground.

**OK: No continuity**

**Q: Is the check result normal?**

**YES :** Go to Step 9.

**NO (Not normal at the terminal No.16 or 15) :** Go to Step 7.

**STEP 7. Connector check: A-03 ABS-ECU connector, C-39 and D-15 intermediate connector, F-02 wheel speed sensor <RR> connector**

**Q: Is the check result normal?**

**YES :** Go to Step 8.

**NO :** Repair the defective connector.

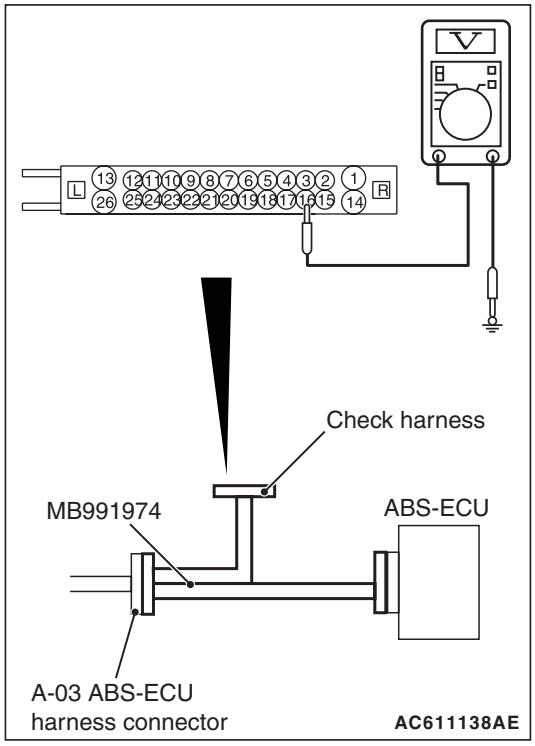
**STEP 8. Wiring harness check between A-03 ABS-ECU connector terminal No.16 and F-02 wheel speed sensor <RR> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.15 and F-02 wheel speed sensor <RR> connector terminal No.2.**

- Check for short circuit in wheel speed sensor <RR> circuit

**Q: Is the check result normal?**

**YES :** Replace the wheel speed sensor <RR>.

**NO :** Repair the wiring harness.




**STEP 9. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the ABS-ECU connector, connect special tool MB991974 to the ABS-ECU-side connector and harness-side connector, and then measure the voltage at the special tool connector side.
(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between the wheel speed sensor circuit power supply terminal (signal terminal) No.16 and body ground.

**OK: System voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Go to Step 12.

**STEP 10. Wiring harness check between A-03 ABS-ECU connector terminal No.16 and F-02 wheel speed sensor <RR> connector terminal No.1, and between A-03 ABS-ECU connector terminal No.15 and F-02 wheel speed sensor <RR> connector terminal No.2.**

- Check for open circuit in wheel speed sensor <RR> circuit

**Q: Is the check result normal?**

**YES :** Go to Step 11.
**NO :** Repair the wiring harness.

**STEP 11. Check for wheel speed sensor as a single unit**

Refer to P.35B-173.

**Q: Is the check result normal?**

**YES :** Go to Step 13.
**NO :** Replace the wheel speed sensor.

**STEP 12. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** Go to Step 16.
**NO :** Repair the defective connector.

**TSB Revision**

**STEP 13. Check for wheel speed sensor installation**

Check how the wheel speed sensor <RR> is installed (Disconnection of wheel speed sensor, loose mounting bolt, etc.).

**Q: Is the check result normal?**

**YES :** Go to Step 14.
**NO :** Reinstall the wheel speed sensor correctly.

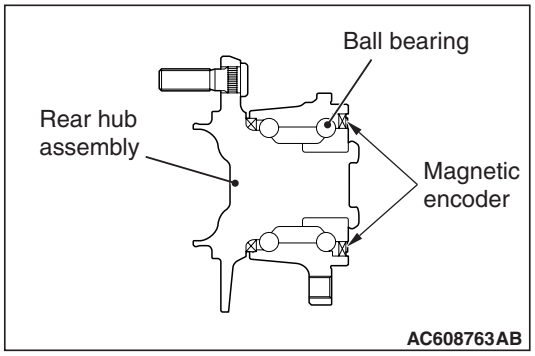
**STEP 14. Check for wheel bearing looseness**

*NOTE: Loose wheel bearing may increase the gap between the wheel speed sensor and the wheel speed detection magnet encoder. Check the wheel bearing <RR> for looseness (Refer to GROUP 27 –On-vehicle Service P.27-5).*

**Q: Is the check result normal?**

**YES :** Go to Step 15.
**NO :** Replace the rear wheel hub assembly.

**STEP 15. Check of wheel speed detection encoder**




Check the encoder for adhesion of foreign materials or deformation.

**Q: Is the check result normal?**

**YES :** Go to Step 16.
**NO (Adhesion of foreign materials) :** Remove the foreign materials and clean the encoder so as not to disturb the magnetization pattern on it while taking care of the magnet, magnetic substance, and magnetic attraction.
**NO (Deformation) :** Replace the rear wheel hub assembly.

**STEP 16. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12mph (20 km/h) or more.

*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12mph (20 km/h) or higher.*

**Q: Is DTC C1049 set?**

**YES :** Replace the ABS-ECU, and then go to Step 5.
**NO :** The procedure is complete.

**DTC C104B: Abnormality in FL wheel inlet valve system**
**DTC C104F: Abnormality in FR wheel inlet valve system**
**DTC C1053: Abnormality in RL wheel inlet valve system**
**DTC C1057: Abnormality in RR wheel inlet valve system**
**DTC C105F: Abnormality in FL wheel outlet valve system**
**DTC C1063: Abnormality in FR wheel outlet valve system**
**DTC C1067: Abnormality in RL wheel outlet valve system**
**DTC C105B: Abnormality in RR wheel outlet valve system**

**⚠ CAUTION**
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

**CIRCUIT OPERATION**
- ABS-ECU contains the power supply circuit (terminal No.26) for the solenoid valve. The solenoid valve is energized by the valve relay, which is incorporated in ABS-ECU.
- The valve relay, which is incorporated in ABS-ECU, is always energizing the solenoid valve unless the initial check is in progress when the ignition switch is turned on, or the recurrent system check is in progress.
- ABS-ECU activates the solenoid valve by turning on its driving transistor.

## DTC SET CONDITIONS
These diagnostic trouble codes will be set under the conditions below:
- The solenoid valve is not energized even after ABS-ECU has turned on valve relay (Open circuit is present in the power supply circuit to the ABS-ECU solenoid valve, or the valve relay has failed).
- The solenoid valve is not activated even after ABS-ECU has turned on the driving transistor (Open circuit is present in the solenoid valve circuit in ABS-ECU, or the valve relay has failed).
- After ABS-ECU has turned off the valve relay, the solenoid valve still remains energized (short in the solenoid valve circuit).
- When a solenoid valve failure is detected

## PROBABLE CAUSES
- ABS-ECU malfunction

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Are DTC C104B, C104F, C1053, C1057, C105F, C1063, C1067 or C105B set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. Check whether the diagnostic trouble code is reset.**

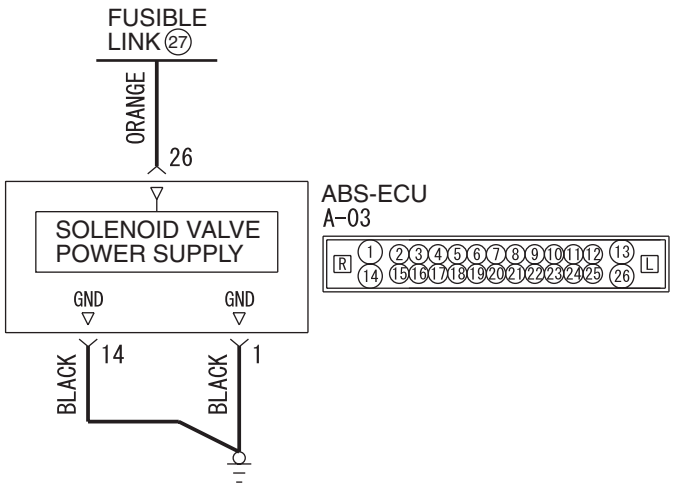
**Q: Are DTC C104B, C104F, C1053, C1057, C105F, C1063, C1067 or C105B set?**

**YES :** Replace the ABS-ECU.

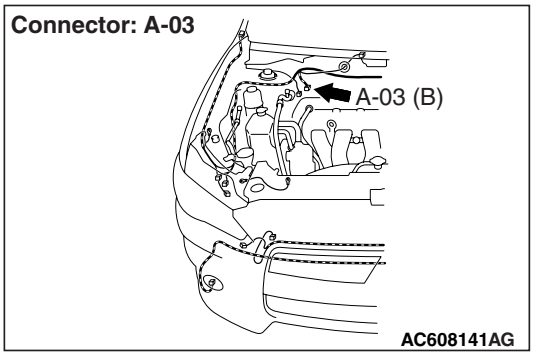
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C2104: Malfunction of power supply circuit

**Solenoid Valve Power Supply Circuit**




AC611095




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### CIRCUIT OPERATION

- ABS-ECU contains the power supply circuit (terminal No.26) for the solenoid valve. The solenoid valve is energized by the valve relay, which is incorporated in ABS-ECU.
- The valve relay, which is incorporated in ABS-ECU, is always energizing the solenoid valve unless the initial check is in progress when the ignition switch is turned on, or the recurrent system check is in progress.

### DTC SET CONDITIONS

This diagnostic trouble codes will be set under the conditions below:

- When the solenoid valve supply voltage is not within the standard value.

**TSB Revision**

## PROBABLE CAUSES

**Current trouble**

- Fusible link malfunction
- Damaged wiring harness and connectors
- Abnormality in battery or generator
- ABS-ECU malfunction

**Past trouble**

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between the power supply circuit (terminal No.26) to ABS-ECU solenoid valve or ground circuit (terminal No.1). For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C2104 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. Fusible link check: Check fusible link No.27.**

Visually check for open circuit in fusible link No.27.

**Q: Is the check result normal?**

**YES :** Go to Step 4.

**NO :** Replace fusible link No.27.

**STEP 4. Battery check**

Refer to GROUP 54A –Battery Test P.54A-6.

**Q: Is the battery in good condition?**

**YES :** Go to Step 5.

**NO :** Charge or replace the battery.

**STEP 5. Charging system check**

Refer to GROUP 16 –Output Current Test P.16-8.

**Q: Is the charging system in good condition?**

**YES :** Go to Step 6.

**NO :** Repair or replace the charging system component(s).

**STEP 6. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

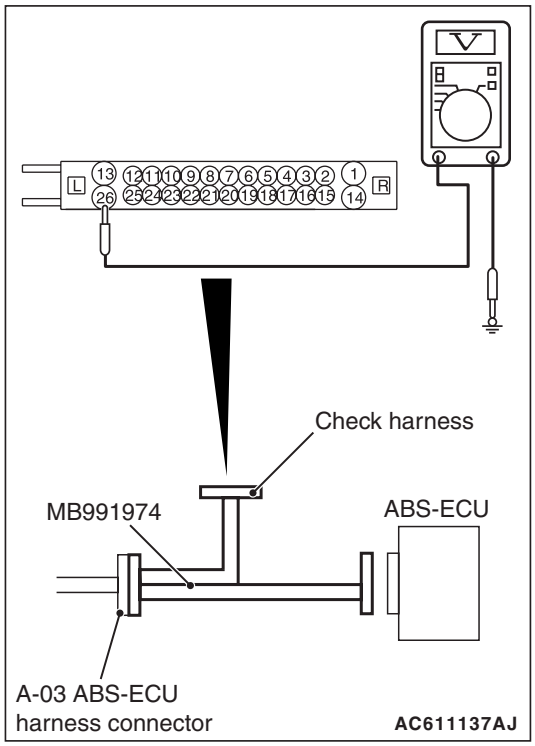
(3) Measure the voltage between terminal No.26 and body ground.

**OK: Approximately battery voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 8.

**NO :** Go to Step 7.




**STEP 7. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** An open or short circuit may be present in the power supply circuit. Repair the wiring harness between the A-03 ABS-ECU connector terminal No.26 and fusible link No.27.

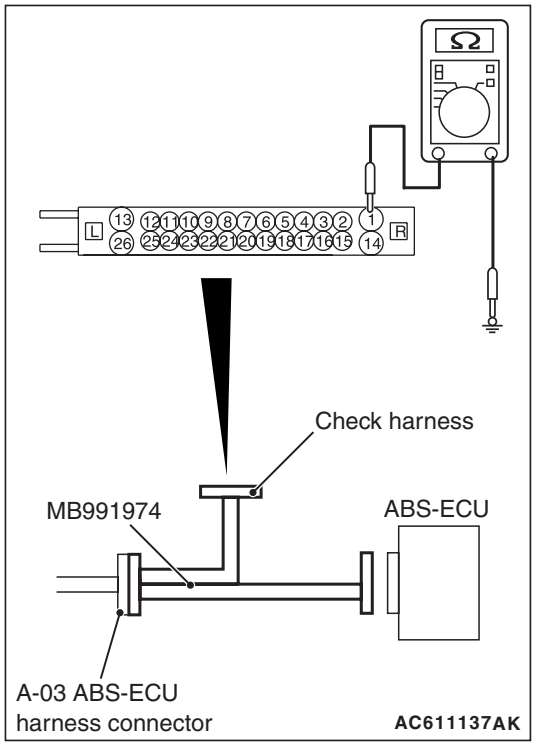
**NO :** Repair the defective connector.

**STEP 8. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

**TSB Revision**




(2) Resistance between the terminal No.1 and body ground, and between terminal No.14 and body ground.

**OK: Continuity exists (2 Ω or less)**

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Go to Step 9.

**STEP 9. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** An open circuit may be present in the ground circuit. Repair the wiring harness between the A-03 ABS-ECU connector terminal No.1 and body ground, and between the A-03 ABS-ECU connector terminal No.14 and body ground.
**NO :** Repair the defective connector.

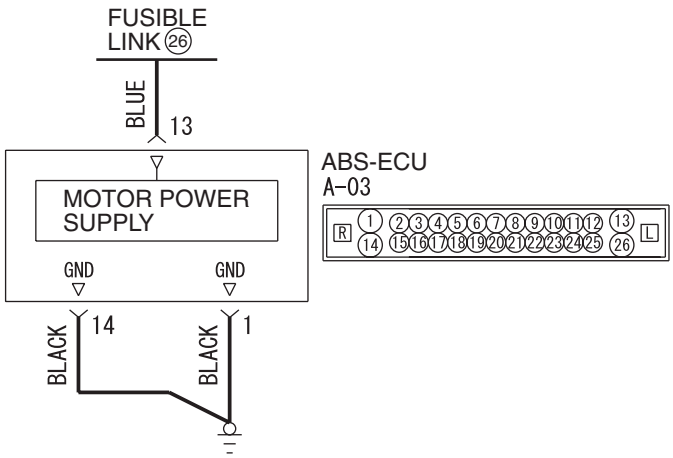
**STEP 10. Check whether the diagnostic trouble code is reset.**

**Q: Is DTC C2104 set?**

**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

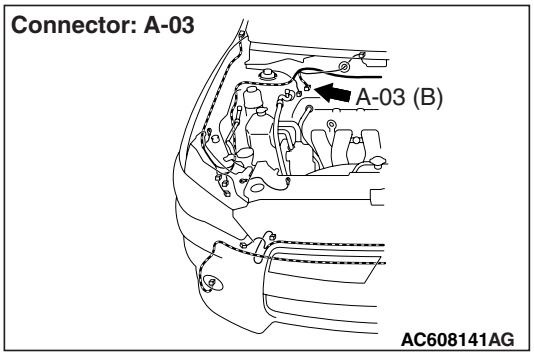
## DTC C1073: Malfunction of motor drive circuit

**Motor Power Supply Circuit**




AC611097

**Connector: A-03**




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### CIRCUIT OPERATION

- ABS-ECU contains the power supply circuit (terminal No.13) for the pump motor. The pump motor is energized by the motor switch, which is incorporated in ABS-ECU.
- The pump motor switch, which is incorporated in ABS-ECU, is always off unless the ABS is operating or motor or solenoid valve check is activated when the vehicle is started.
- ABS-ECU activates the pump motor by turning on the ECU built-in pump motor switch.

### DTC SET CONDITIONS

If the pump motor switch voltage drop indicates high value when the pump motor operates or after the operation, the pump motor operation is stopped and this diagnostic trouble code is set.

**TSB Revision**

## PROBABLE CAUSES

**Current trouble**

- Fusible link malfunction
- Damaged wiring harness and connectors
- Abnormality in battery or generator
- ABS-ECU malfunction

**Past trouble**

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between the power supply circuit (A-03 ABS-ECU connector terminal No.13) to the ABS-ECU motor and the ground circuit (A-03 ABS-ECU connector terminal No.14). For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Check whether the diagnostic trouble code is reset.**

**Q: Is DTC C1073 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. Fusible link check: Check fusible link No.26.**

**Q: Is the check result normal?**

**YES :** Go to Step 4.

**NO :** Replace fusible link No.26.

**STEP 4. Battery check**

Refer to GROUP 54A –Battery Test P.54A-6.

**Q: Is the battery in good condition?**

**YES :** Go to Step 5.

**NO :** Charge or replace the battery.

**STEP 5. Charging system check**

Refer to GROUP 16 –Output Current Test P.16-8.

**Q: Is the charging system in good condition?**

**YES :** Go to Step 6.

**NO :** Repair or replace the charging system component(s).

**STEP 6. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

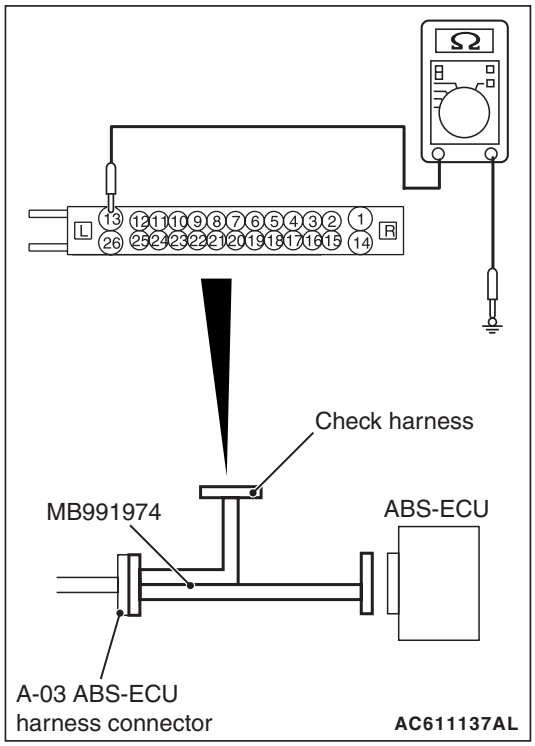
(3) Measure the voltage between terminal No.13 and body ground.

**OK: Approximately battery voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 8.

**NO :** Go to Step 7.




**STEP 7. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** An open or short circuit may be present in the solenoid valve power supply circuit. Repair the wiring harness between the A-03 ABS-ECU connector terminal No.13 and fusible link No.26.

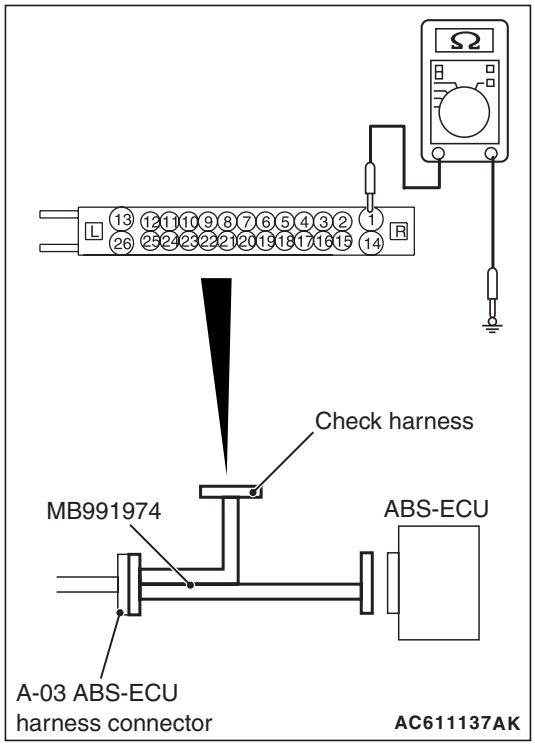
**NO :** Repair the defective connector.

**STEP 8. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

**TSB Revision**




(2) Resistance between terminal No.1 and body ground, and between terminal No.14 and body ground.

**OK: Continuity exists (2 Ω or less)**

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Go to Step 9.

**STEP 9. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** An open circuit may be present in the ground circuit. Repair the wiring harness between A-03 ABS-ECU terminal No.1 and body ground, and between the A-03 ABS-ECU terminal No.14 and body ground.
**NO :** Repair the defective connector.

**STEP 10. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12 mph (20 km/h) or more.

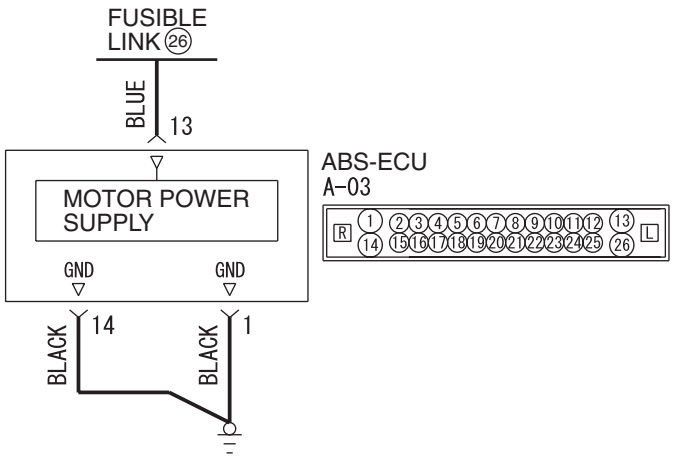
*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12 mph (20 km/h) or higher.*

**Q: Is DTC C1073 set?**

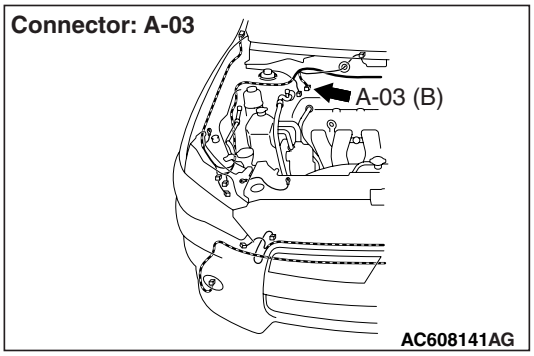
**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C2116: Abnormality in pump motor power supply voltage

**Motor Power Supply Circuit**




AC611097




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## CIRCUIT OPERATION

- ABS-ECU contains the power supply circuit (terminal No.13) for the pump motor. The pump motor is energized by the motor switch, which is incorporated in ABS-ECU.
- The pump motor switch, which is incorporated in ABS-ECU, is always off unless the ABS is operating or motor or solenoid valve check is activated when the vehicle is started.
- ABS-ECU activates the pump motor by turning on the ECU built-in pump motor switch.

**TSB Revision**

## DTC SET CONDITIONS

This diagnostic trouble codes will be set under the conditions below:

- When the power supply voltage of the pump motor, which is not in operation, is abnormally low for a prolonged period
- When the power supply voltage of the pump motor, which is not in operation, is abnormally high for a prolonged period

## PROBABLE CAUSES

**Current trouble**

- Fusible link malfunction
- Damaged wiring harness and connectors
- Abnormality in battery or generator
- ABS-ECU malfunction

**Past trouble**

- Carry out diagnosis with particular emphasis on wiring harness and connector failures between the power supply circuit (A-03 ABS-ECU connector terminal No.13) to the ABS-ECU motor and the ground circuit (A-03 ABS-ECU connector terminal No.14). For diagnosis procedures, refer to How to treat past trouble (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C2116 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. Fusible link check: Check fusible link No.26.**

**Q: Is the check result normal?**

**YES :** Go to Step 4.

**NO :** Replace fusible link No.26.

**STEP 4. Battery check**

Refer to GROUP 54A –Battery Test P.54A-6.

**Q: Is the battery in good condition?**

**YES :** Go to Step 5.
**NO :** Charge or replace the battery.

**STEP 5. Charging system check**

Refer to GROUP 16 –Output Current Test P.16-8.

**Q: Is the charging system in good condition?**

**YES :** Go to Step 6.
**NO :** Repair or replace the charging system component(s).

**STEP 6. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

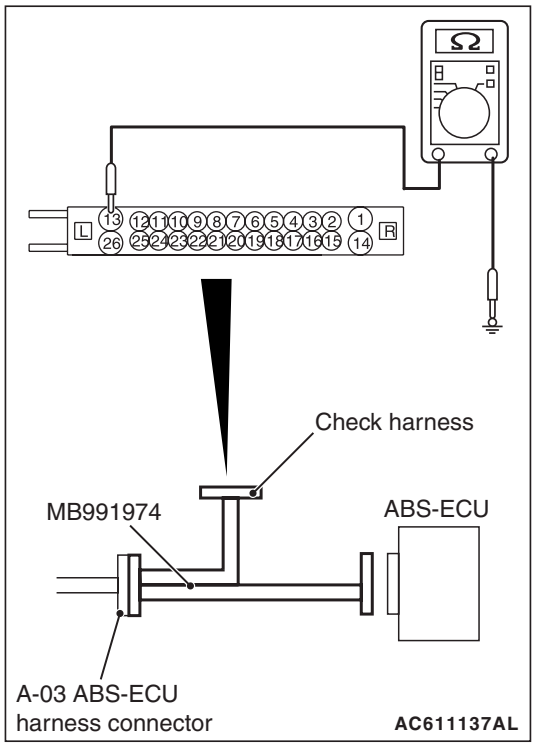
*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between terminal No.13 and body ground.

**OK: Approximately battery voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 8.
**NO :** Go to Step 7.

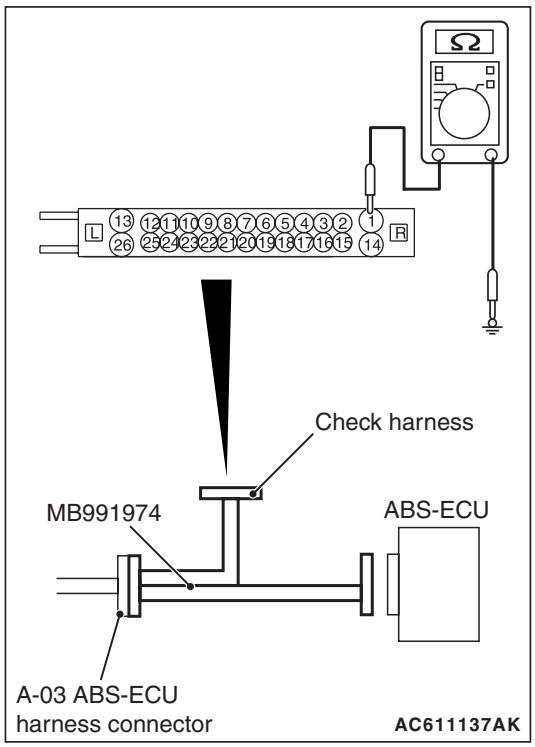



**STEP 7. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** An open or short circuit may be present in the solenoid valve power supply circuit. Repair the wiring harness between the A-03 ABS-ECU connector terminal No.13 and fusible link No.26.
**NO :** Repair the defective connector.

**TSB Revision**




**STEP 8. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Resistance between terminal No.1 and body ground, and between terminal No.14 and body ground.

**OK: Continuity exists (2 Ω or less)**

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Go to Step 9.

**STEP 9. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** An open circuit may be present in the ground circuit. Repair the wiring harness between the A-03 ABS-ECU terminal No.1 and body ground, and between the A-03 ABS-ECU terminal No.14 and body ground.
**NO :** Repair the defective connector.

**STEP 10. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Drive the vehicle at 12 mph (20 km/h) or more.

*NOTE: The ABS warning light does not turn OFF in some cases unless the vehicle runs at 12 mph (20 km/h) or higher.*

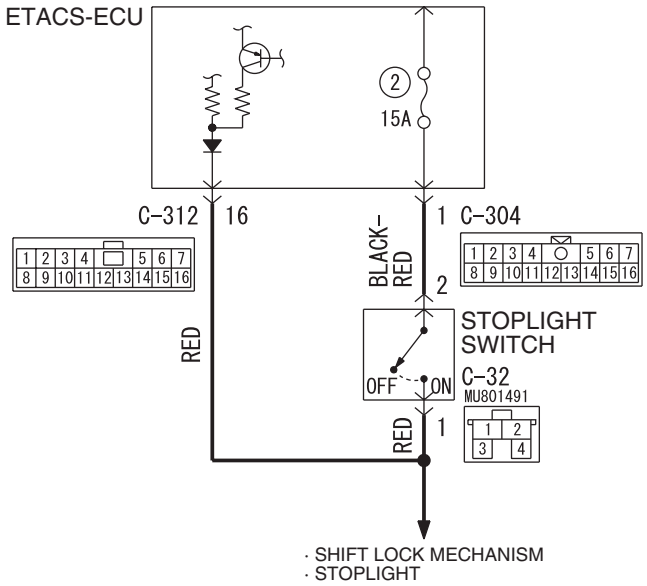
**Q: Is DTC C2116 set?**

**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

**TSB Revision**

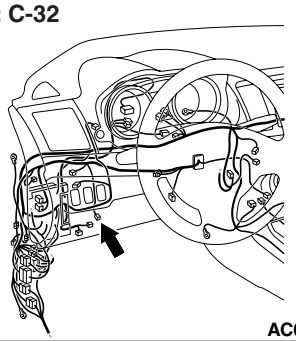
## DTC C1000: Abnormality in stop light switch circuit

**Stoplight Switch Circuit**



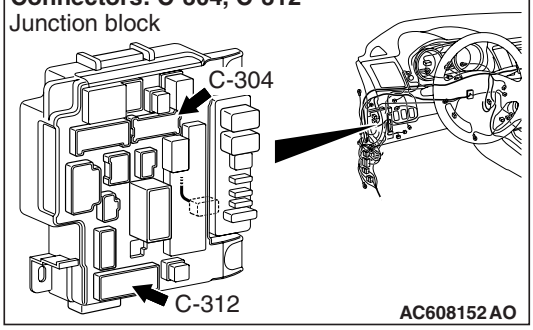

W8G35M003A

**Connector: C-32**



AC608145BO

**Connectors: C-304, C-312**
Junction block




AC608152AO

**⚠ CAUTION**
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### CIRCUIT OPERATION

ETACS-ECU sends the ON signal generated when the brake pedal is depressed and OFF signal generated when it is released to ABS-ECU via the CAN bus lines.

### DTC SET CONDITIONS

This diagnostic trouble code is set in the following case.

- When the vehicle has run for a long time with the stop light switch turned ON.
- When there is difference between the stop light switch state and the vehicle's behavior

| TSB Revision |
|---|

## PROBABLE CAUSES

- Improper adjustment of stop light switch installation position
- Malfunction of the stop light switch
- Damaged wiring harness and connectors
- Malfunction of ETACS-ECU
- ABS-ECU malfunction

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1000 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. Stop light operation check**

(1) Turn the ignition switch to the ON position.

(2) Check the stop light operation when the brake pedal is depressed. Check that the stop light illuminates when the brake pedal is depressed and that it goes out when the brake pedal is released.

**OK:**
**When the brake pedal is released: OFF**
**When the brake pedal is depressed: ON**

**Q: Is the check result normal?**

**YES :** Go to Step 10.

**NO :** Go to Step 4.

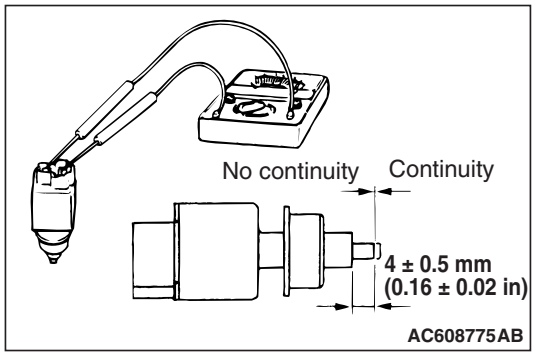
**STEP 4. Check stop light switch installation**

Refer to GROUP 35A –On-vehicle Service P.35A-19.

**Q: Is the check result normal?**

**YES :** Go to Step 5.

**NO :** Install the stop light switch correctly.




**STEP 5. Stop light switch continuity check**

(1) Remove the stop light switch (Refer to GROUP 35A –Brake Pedal P.35A-34).
(2) Connect the circuit tester (Ω range) to the stop light switch connector terminals No.1 and 2.
(3) When no continuity is detected with the plunger pressed from the edge of the outer case by the dimension shown in the figure and when continuity is detected with the plunger released, the stop light switch is in good condition.

**Q: Is the check result normal?**

**YES :** Go to Step 6.
**NO :** Replace the stop light switch.

**STEP 6. Check any other diagnostic trouble code is set.**

Check if stop light-related DTC is set (Refer to GROUP 54A – Rear Combination Light P.54A-157).

**Q: Is the check result normal?**

**YES :** Go to Step 7.
**NO :** Carry out the relevant diagnosis for the set DTC.

**STEP 7. Voltage measurement at C-304 ETACS-ECU connector**

(1) Turn the ignition switch to the ON position.
(2) Measure the voltage between terminal No.1 and body ground.

**OK: Approximately battery voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 8.
**NO :** Go to Step 9.

**STEP 8. Connector check: C-304 ETACS-ECU connector, C-32 stop light switch connector**

**Q: Is the check result normal?**

**YES :** The short circuit between the C-304 ETACS-ECU connector terminal No.1 and the C-32 stop light switch connector terminal No.2 may be present. Repair the wiring harness between the C-304 ETACS-ECU connector terminal No.1 and the C-32 stop light switch connector terminal No.2.
**NO :** Repair the defective connector.

**STEP 9. ETACS-ECU fuse No.2 check**

**Q: Is the check result normal?**

**YES :** Replace the ETACS-ECU, and then go to Step 12.
**NO :** Replace the fuse No.2.

**TSB Revision**

**STEP 10. Voltage measurement at C-312 ETACS-ECU connector**

(1) Turn the ignition switch to the ON position.

**⚠ CAUTION**

**Do not depress the brake pedal.**

(2) Measure the voltage between terminal No.16 and body ground.

**OK: Approximately 5 volts**

**Q: Is the check result normal?**

**YES :** Go to Step 11.

**NO :** Replace the ETACS-ECU, and then go to Step 12.

**STEP 11. Connector check: C-312 ETACS-ECU connector, C-32 stop light switch connector**

**Q: Is the check result normal?**

**YES :** The short circuit between the C-312 ETACS-ECU connector terminal No.16 and the C-32 stop light switch connector terminal No.1 may be present. Repair the wiring harness between the C-312 ETACS-ECU connector terminal No.16 and the C-32 stop light switch connector terminal No.1.

**NO :** Repair the defective connector.

**STEP 12. Check whether the diagnostic trouble code is reset.**

**Q: Is DTC 1000 set?**

**YES :** Replace the ABS-ECU.

**NO :** The procedure is complete.

## DTC C2200: Abnormality in ABS-ECU

⚠ CAUTION
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### CIRCUIT OPERATION

- ABS-ECU controls ABS by calculating the data sent from the wheel speed sensor.
- The ABS-ECU always monitors itself while the system is in operation. If the ABS-ECU detects any faults, it will set this DTC.

### DTC SET CONDITIONS

This diagnostic trouble code is set when ABS-ECU has malfunction.

### PROBABLE CAUSES

ABS-ECU malfunction

### DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 2.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

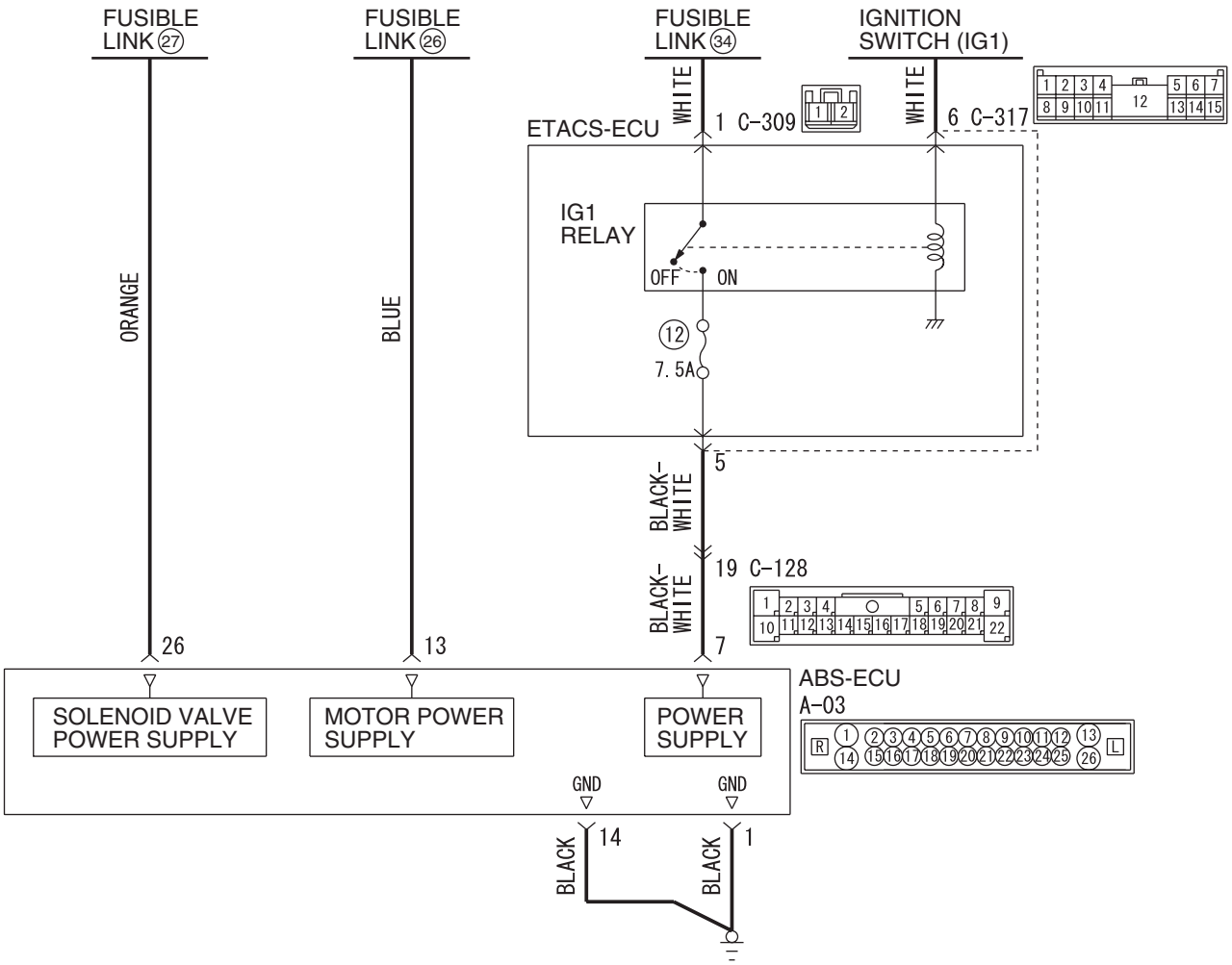
**Q: Is DTC C2200 set?**

**YES :** Replace the ABS-ECU.

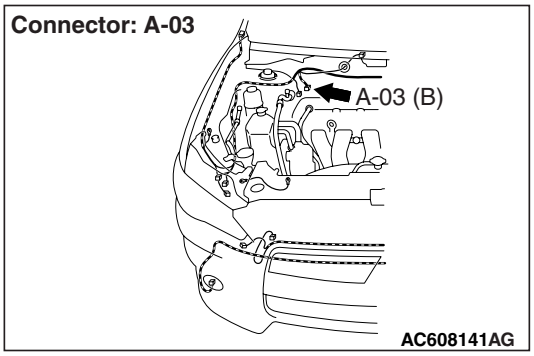
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C2100: Abnormality in battery voltage (low voltage)

**Power Supply Circuit**




W8G35M004A




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

**TSB Revision**

## CIRCUIT OPERATION

The ABS-ECU is energized by the valve power supply circuit (terminal No. 26).When the power is supplied from the ignition switch (IG1) to the IG1 relay in ETACS-ECU, IG1 relay is turned on. At this time, the valve power supply circuit (terminal No. 26) energizes the ABS-ECU.

## DTC SET CONDITIONS

This diagnostic trouble code is set in the following case.

- When the ABS-ECU power supply voltage drops below 9.7 ±0.3 V while driving

## PROBABLE CAUSES

- Battery failure
- Battery terminal looseness
- Fusible link malfunction
- Charging system failed
- Damaged wiring harness and connectors
- ABS-ECU malfunction

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, and then go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C2100 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. Fusible link check: Check fusible link No.27.**

Visually check for open circuit in fusible link No.27.

**Q: Is the check result normal?**

**YES :** Go to Step 4.

**NO :** Replace fusible link No.27.

**STEP 4. Battery check**

Refer to GROUP 54A –Battery Test P.54A-6.

**Q: Is the battery in good condition?**

**YES :** Go to Step 5.
**NO :** Charge or replace the battery.

**STEP 5. Charging system check**

Refer to GROUP 16 –Output Current Test P.16-8.

**Q: Is the charging system in good condition?**

**YES :** Go to Step 6.
**NO :** Repair or replace the charging system component(s).

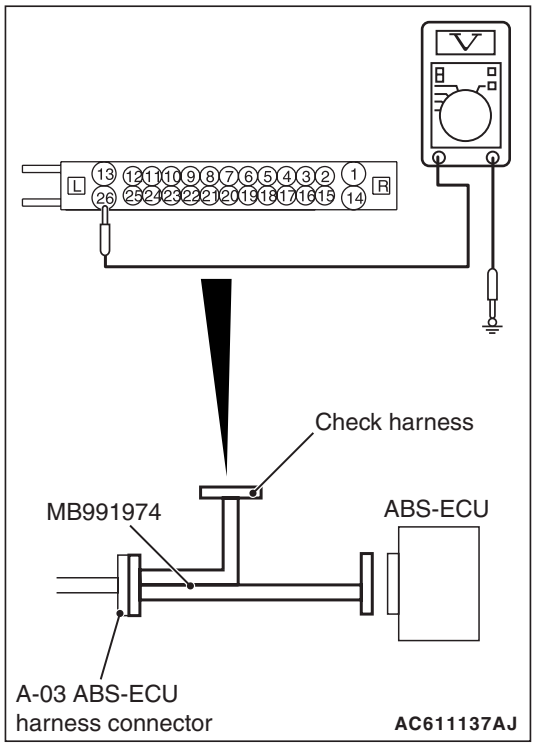
**STEP 6. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between terminal No.26 and body ground.

**OK: Approximately battery voltage**




**Q: Is the check result normal?**

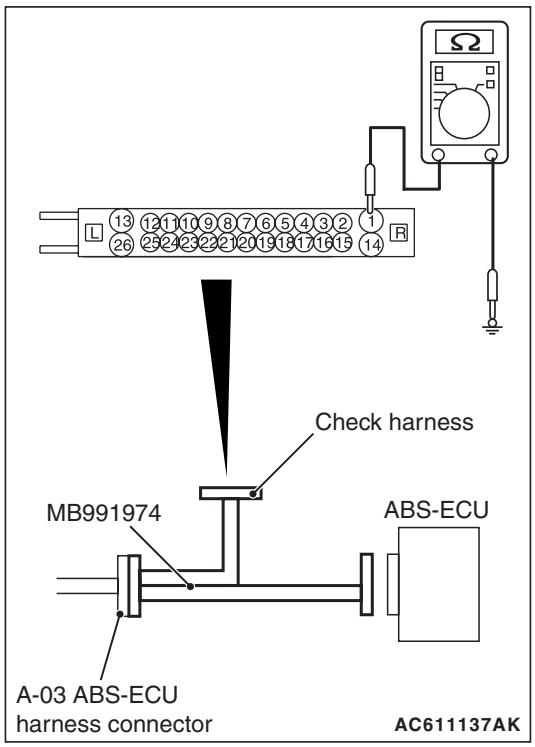
**YES :** Go to Step 8.
**NO :** Go to Step 7.

**STEP 7. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** The open or short circuit may be present in the power supply circuit. Repair the wiring harness between the A-03 ABS-ECU connector terminal No.26 and fusible link No.27.
**NO :** Repair the defective connector.

**TSB Revision**




**STEP 8. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Resistance between terminal No.1 and body ground, and between terminal No.14 and body ground.

**OK: Continuity exists (2 Ω or less)**

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Go to Step 9.

**STEP 9. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** An open circuit may be present in the ground circuit. Repair the wiring harness between the A-03 ABS-ECU terminal No.1 and body ground, and between the A-03 ABS-ECU terminal No.14 and body ground.
**NO :** Repair the defective connector.

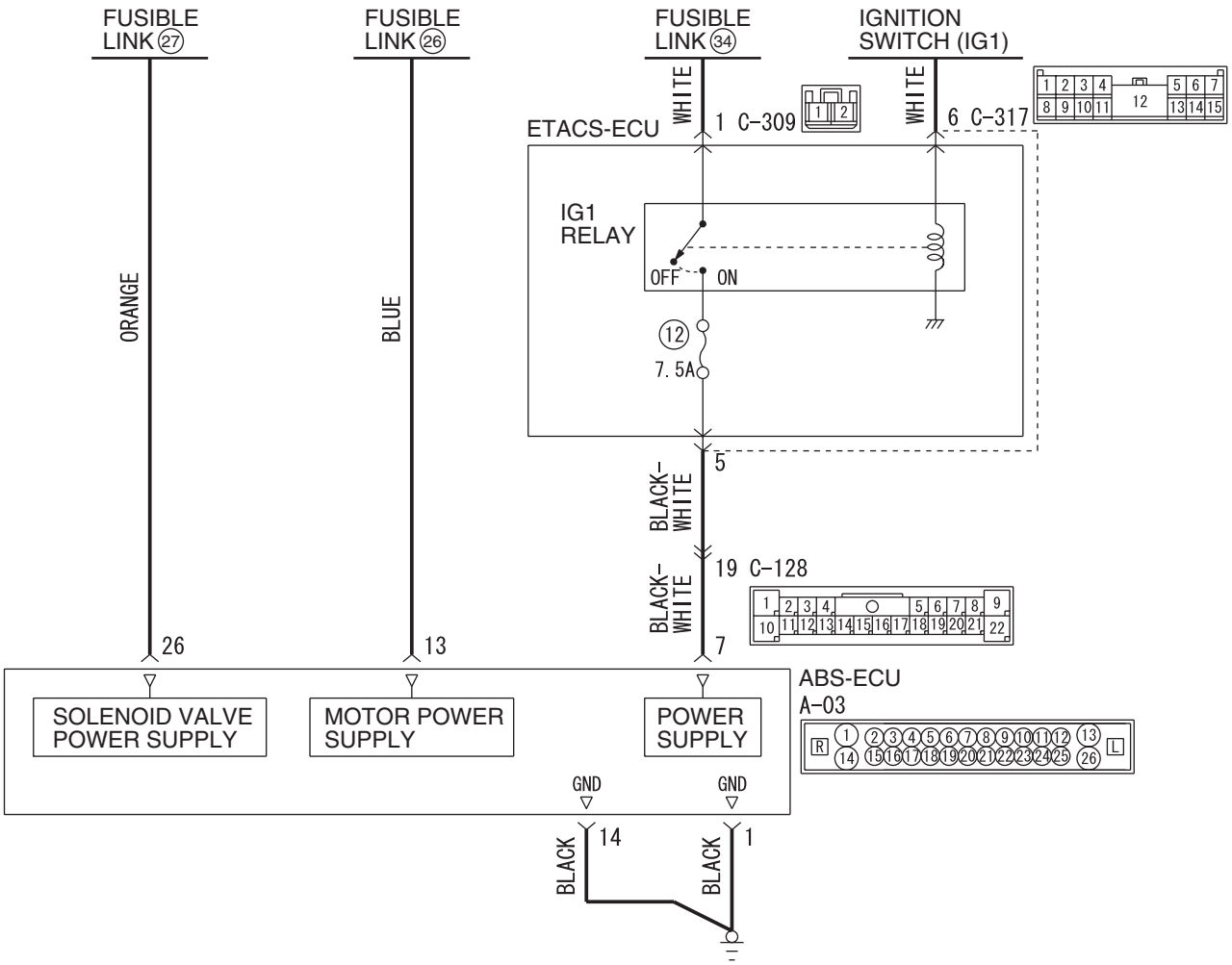
**STEP 10. Check whether the diagnostic trouble code is reset.**

**Q: Is DTC C2100 set?**

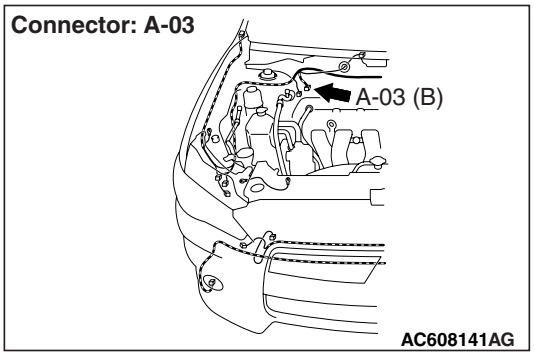
**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C2101: Abnormality in battery voltage (high voltage)

**Power Supply Circuit**




W8G35M004A




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

**TSB Revision**

## CIRCUIT OPERATION

The ABS-ECU is energized by the valve power supply circuit (terminal No. 26).When the power is supplied from the ignition switch (IG1) to the IG1 relay in ETACS-ECU, IG1 relay is turned on. At this time, the valve power supply circuit (terminal No. 26) energizes the ABS-ECU.

## DTC SET CONDITIONS

This diagnostic trouble code is set when the ABS-ECU power supply voltage is more than 18.0 ±1.0 volts.

## PROBABLE CAUSES

- Battery failure
- Fusible link malfunction
- Damaged wiring harness and connectors
- ABS-ECU malfunction
- Charging system failed

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C2101 set?**

**YES :** Go to Step 3.

**NO :** The procedure is complete.

**STEP 3. Fusible link check: Check fusible link No.27.**

Visually check for open circuit in fusible link No.27.

**Q: Is the check result normal?**

**YES :** Go to Step 4.

**NO :** Replace fusible link No.27.

**STEP 4. Battery check**

Refer to GROUP 54A –Battery Test P.54A-6.

**Q: Is the battery in good condition?**

**YES :** Go to Step 5.
**NO :** Charge or replace the battery.

**STEP 5. Charging system check**

Refer to GROUP 16 –Output Current Test P.16-8.

**Q: Is the charging system in good condition?**

**YES :** Go to Step 6.
**NO :** Repair or replace the charging system component(s).

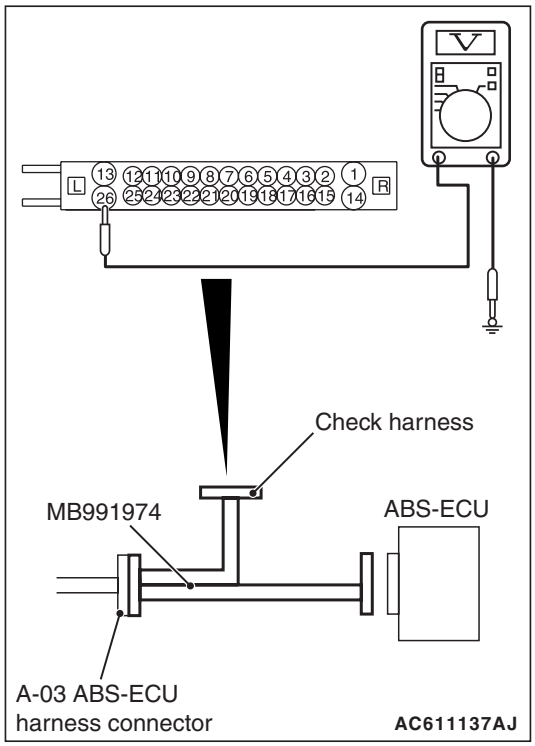
**STEP 6. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.
(3) Measure the voltage between terminal No.26 and body ground.

**OK: Approximately battery voltage**




**Q: Is the check result normal?**

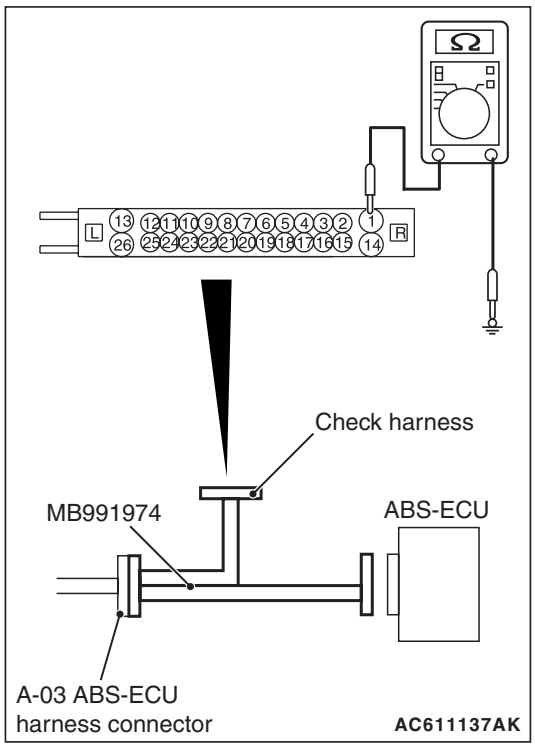
**YES :** Go to Step 8.
**NO :** Go to Step 7.

**STEP 7. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** The open or short circuit may be present in the power supply circuit. Repair the wiring harness between the A-03 ABS-ECU connector terminal No.26 and fusible link No.27.
**NO :** Repair the defective connector.

**TSB Revision**




**STEP 8. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Resistance between terminal No.1 and body ground, and between terminal No.14 and body ground.

**OK: Continuity exists (2 Ω or less)**

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Go to Step 9.

**STEP 9. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** An open circuit may be present in the ground circuit. Repair the wiring harness between the A-03 ABS-ECU terminal No.1 and body ground, and between the A-03 ABS-ECU terminal No.14 and body ground.
**NO :** Repair the defective connector.

**STEP 10. Check whether the diagnostic trouble code is reset.**

**Q: Is DTC C2101 set?**

**YES :** Replace the ABS-ECU.
**NO :** Intermittent malfunction (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).

## DTC C1395: Brake fluid filling not completed

⚠ CAUTION
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

### DTC SET CONDITIONS

This diagnostic trouble code is set when the brake fluid is not filled in the hydraulic unit.

### PROBABLE CAUSES

- Different hydraulic unit (For delivery to factory)
- ABS-ECU malfunction

### DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1395 set?**

**YES :** Replace the ABS-ECU.
**NO :** The procedure is complete.

## DTC C2203: VIN not recorded

⚠ CAUTION
- **If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**
- **When other diagnostic trouble code for ABS-ECU is set, troubleshoot that diagnostic trouble code first.**

### CIRCUIT OPERATION
ABS-ECU receives vehicle information number from the engine ECU and stores it.

### DTC SET CONDITIONS
This diagnostic trouble code is set when ABS-ECU cannot receive the vehicle information number from the engine-ECU.

### PROBABLE CAUSES
- Malfunction of the CAN bus
- Engine-ECU malfunction
- ABS-ECU malfunction

### DIAGNOSIS
**Required Special Tools:**
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**
Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C2203 set?**

**YES :** Go to Step 3.
**NO :** The procedure is complete.

**STEP 3. M.U.T.-III diagnostic trouble code**

Check for engine-ECU diagnostic trouble code.

**Q: Is any DTC set?**

**YES :** Troubleshoot the engine ECU diagnostic trouble code (Refer to GROUP 13A –Diagnostic trouble code chart P.13A-46).

**NO :** Go to Step 4.

**STEP 4. Check whether the diagnostic trouble code is reset.**

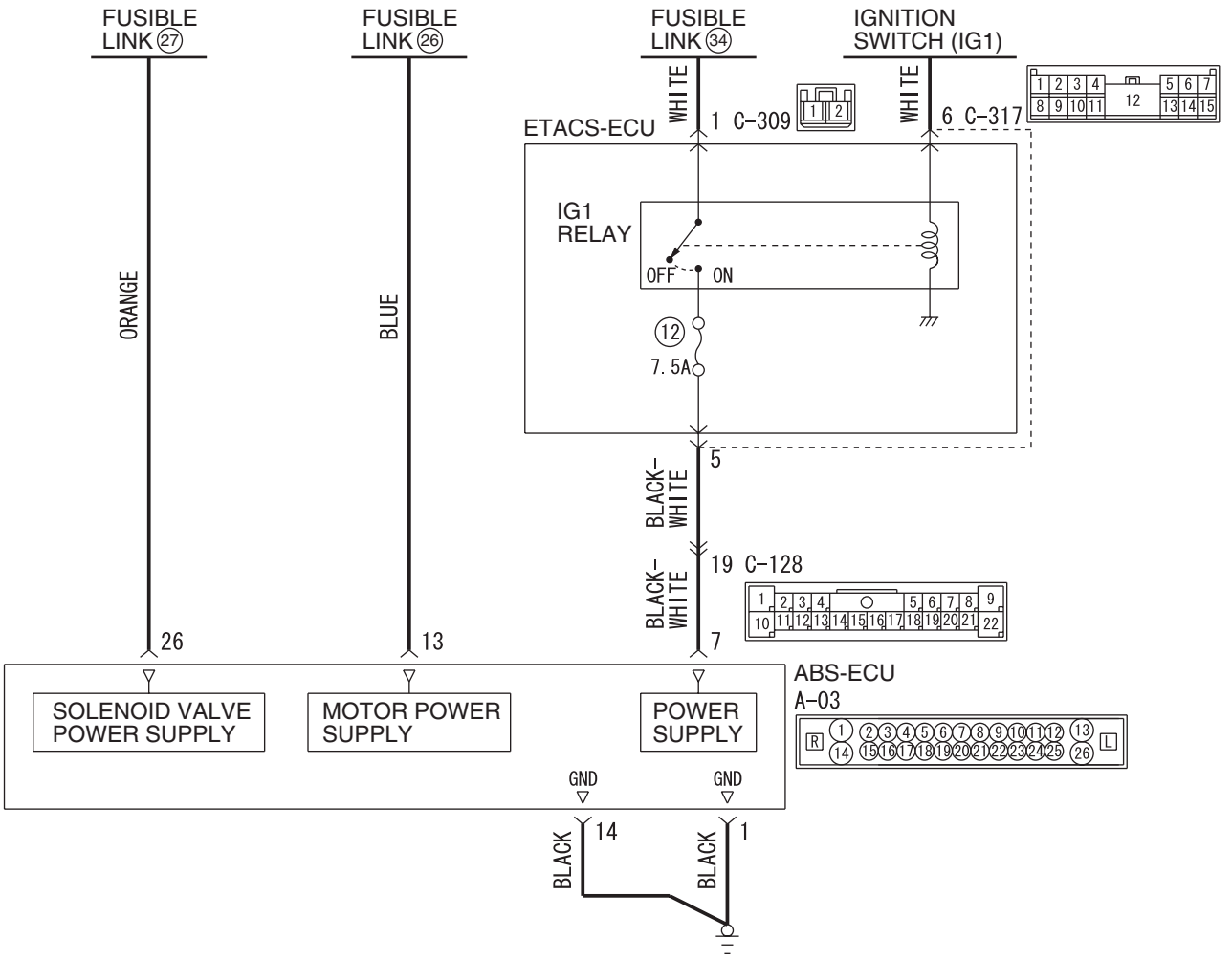
**Q: Is DTC C2203 set?**

**YES :** Replace the ABS-ECU.

**NO :** The procedure is complete.

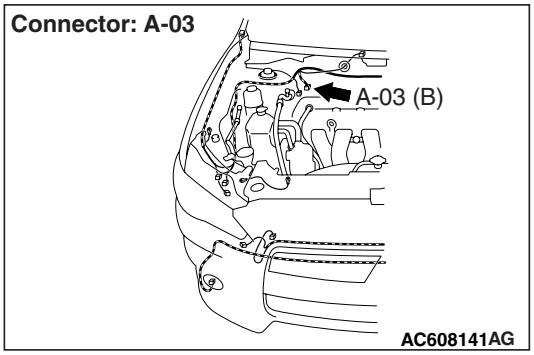
## DTC C1608: Implausible diagnosis data

**Power Supply Circuit**




W8G35M004A

**TSB Revision**




**⚠ CAUTION**

- **If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**
- **If the ABS-ECU connector is disconnected or the battery terminal is disconnected when the ignition switch is ON, this diagnostic trouble code may be set.**
- **Since the failure information stored in the past is erased after this diagnosis is carried out, reproduce the state of malfunction.**

## CIRCUIT OPERATION

The ABS-ECU stores diagnostic trouble codes and failure information in the EEPROM*.

*NOTE: *:EEPROM (Electrical Erasable and Programmable ROM)*

## DTC SET CONDITIONS

This diagnostic trouble code is set when the failure information stored in the EEPROM is not reliable. The failure information stored in the past is not output, and only this diagnostic trouble code is set.

## PROBABLE CAUSES

- Disconnection of the ABS-ECU connector or the battery terminal when the ignition switch is ON
- Loose battery terminal
- Abnormality in battery
- Damaged wiring harness and connectors
- ABS-ECU malfunction

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**TSB Revision**

**STEP 1. M.U.T.-III CAN bus diagnostics**
Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, and then go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC C1608 set?**

**YES :** Go to Step 3.
**NO :** The procedure is complete.

**STEP 3. Battery check**
Refer to GROUP 54A –Battery Test P.54A-6.

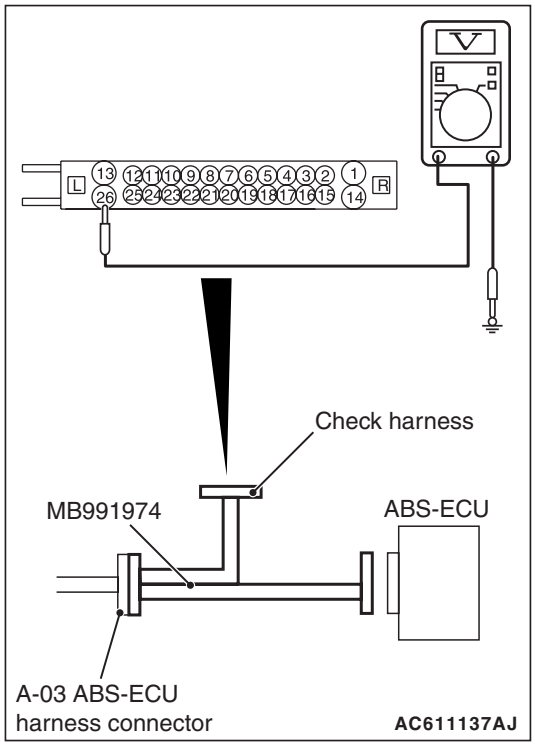
**Q: Is the battery in good condition?**

**YES :** Go to Step 5.
**NO :** Go to Step 4.

**STEP 4. Charging system check**
Refer to GROUP 16 –Output Current Test P.16-8.

**Q: Is the charging system in good condition?**

**YES :** Replace the battery. Then go to Step 9.
**NO :** Repair or replace the charging system component(s).




**STEP 5. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

(3) Measure the voltage between terminal No.26 and body ground.

**OK: Approximately battery voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 7.

**NO :** Go to Step 6.

**STEP 6. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

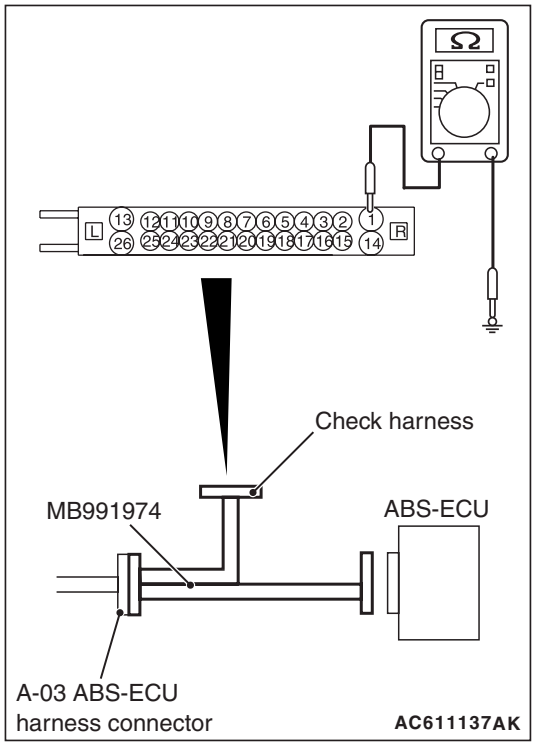
**YES :** The open or short circuit may be present in the power supply circuit. Repair the wiring harness between the A-03 ABS-ECU connector terminal No.26 and fusible link No.27.

**NO :** Repair the defective connector.

**STEP 7. Resistance measurement at A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the resistance at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*




(2) Resistance between terminal No.1 and body ground, and between terminal No.14 and body ground.

**OK: Continuity exists (2 Ω or less)**

**Q: Is the check result normal?**

**YES :** Go to Step 9.
**NO :** Go to Step 8.

**STEP 8. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** An open circuit may be present in the ground circuit. Repair the wiring harness between the A-03 ABS-ECU terminal No.1 and body ground, and between the A-03 ABS-ECU terminal No.14 and body ground.
**NO :** Repair the defective connector.

**STEP 9. Check whether the diagnostic trouble code is reset.**

(1) Erase the diagnostic trouble code.
(2) Turn the ignition switch to the "LOCK" (OFF) position.
(3) Turn the ignition switch to the "ON" position.

**Q: Is any DTC set?**

**YES (DTC C1608 is set) :** Replace the ABS-ECU.
**YES (DTC other than C1608 is set) :** Carry out the applicable troubleshooting for the diagnostic trouble code.
**NO :** This diagnosis is complete.

## DTC U0001: Bus-off

⚠ CAUTION
- **If diagnostic trouble code U0001 is set in ABS-ECU, always diagnose the CAN bus line. If there is any fault in the CAN bus lines, an incorrect diagnostic trouble code may be set. In this case, the set diagnostic trouble code is not highly reliable.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

### DTC SET CONDITIONS
This diagnostic trouble code is set when ABS-ECU has ceased the CAN communication (bus off).

### PROBABLE CAUSES
- Wiring harness or connector failure of CAN bus line
- ABS-ECU malfunction
- Other ECU malfunction

### DIAGNOSIS
**Required Special Tools:**
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**
Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 3.

**STEP 2. Check whether the diagnostic trouble code is reset.**

**Q: Is DTC U0001 set?**

**YES :** Replace the ABS-ECU.
**NO :** If the trouble symptom is resolved, an intermittent malfunction such as poorly engaged connector(s) or wiring harness is suspected (Refer to GROUP 00 – How to Cope with Intermittent Malfunction P.00-13).

**STEP 3. Check whether the diagnostic trouble code is reset.**

**Q: Is DTC U0001 set?**

**YES :** Return to Step 1.
**NO :** The procedure is complete.

## DTC U0100: Engine time-out error
## DTC U0141: ETACS time-out error

**⚠ CAUTION**

- **If the diagnostic trouble codes U0100 and U0141 are set in ABS-ECU, always diagnose the CAN bus line. If there is any fault in the CAN bus lines, an incorrect diagnostic trouble code may be set. In this case, the set diagnostic trouble code is not highly reliable.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**

### CIRCUIT OPERATION

ABS-ECU communicates with the engine ECU and ETACS-ECU via the CAN bus lines.

### DTC SET CONDITIONS

This diagnostic trouble code is set if ABS-ECU cannot receive the signal sent from other ECU for a certain period.

### PROBABLE CAUSES

**DTC U0100**

- Wiring harness or connector failure of CAN bus line
- Engine ECU malfunction
- ABS-ECU malfunction

**DTC U0141**

- Wiring harness or connector failure of CAN bus line
- Malfunction of ETACS-ECU
- ABS-ECU malfunction

### DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 2.
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 4.

**STEP 2. Check whether the diagnostic trouble code is reset.**

**Q: Is DTC U0100 or U0141 set?**

**YES :** Go to Step 3.
**NO :** The procedure is complete.

**TSB Revision**

**STEP 3. M.U.T.-III other system diagnostic trouble code**
Use scan tool to check that other diagnostic trouble code is set in the ECU corresponding to the relevant diagnosis.

**Q: Is other DTC set?**

**YES :** Troubleshoot for the relevant diagnostic trouble code.
**NO :** Go to Step 4.

**STEP 4. M.U.T.-III diagnostic trouble code**
Use scan tool to check that the diagnostic trouble code is set in ABS-ECU or other ECU.

**Q: Is any DTC set?**

**YES (DTC U0100 is set in ABS-ECU and other ECU) :** Replace the engine ECU, and then go to Step 5.
**YES (DTC U0141 is set in ABS-ECU and other ECU) :** Replace the ETACS-ECU, and then go to Step 5.
**NO (No DTC is set.) :** Go to Step 5.

**STEP 5. Check whether the diagnostic trouble code is reset.**

**Q: Is DTC U0100 or U0141 set?**

**YES :** Replace the ABS-ECU.
**NO :** The procedure is complete.

## DTC U1415: Variant coding not implemented

**⚠ CAUTION**
**When the diagnostic trouble code U1415 is set in ABS-ECU, the diagnostic trouble code may also be set in ETACS-ECU. When the diagnostic Trouble code is set in ETACS-ECU, carry out the diagnosis of the diagnostic Trouble code for ETACS-ECU first.**

### CIRCUIT OPERATION

- ABS-ECU receives the vehicle information stored in the ETACS-ECU via CAN bus lines.
- The ABS-ECU stores the tire size information sent from the ETACS.

### DTC SET CONDITIONS

This diagnostic trouble code is set when the tire size information is not coded to the ABS-ECU.

### PROBABLE CAUSES

- Variant coding for ETACS-ECU has not been implemented.
- Malfunction of ABS-ECU.

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 2.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 4.

**STEP 2. M.U.T.-III other system diagnostic Trouble code**

Use scan tool to check that the diagnostic trouble code B222C is set in the ETACS-ECU.

**Q: Is any DTC set?**

**YES :** Troubleshoot the relevant diagnostic trouble code, and then go to Step 4.

**NO :** Go to Step 3.

**STEP 3. Check whether the diagnostic Trouble code is reset.**

(1) Turn the ignition switch to the "ON" position.
(2) Turn the ignition switch to the "OFF" position.
(3) Check that the ABS warning light goes out when the ignition switch is turned to the "ON" position.

**Q: Is DTC U1415 set?**

**YES :** Replace the ABS-ECU. Go to Step 4.

**NO :** If the trouble symptom is resolved, an intermittent malfunction such as poorly engaged connector(s) or wiring harness is suspected (Refer to GROUP 00 – How to Cope with Intermittent Malfunction P.00-13).

**STEP 4. Ensure that the ABS warning light is off.**

(1) Turn the ignition switch to the "ON" position.
(2) Turn the ignition switch to the "OFF" position.
(3) Check that the ABS warning light goes out when the ignition switch is turned to the "ON" position.

**Q: Is the check result normal?**

**YES :** Go to Step 5.

**NO :** The procedure is complete.

**STEP 5. Check whether the diagnostic trouble code is reset.**

**Q: Is DTC U1415 set?**

**YES :** Return to Step 1.

**NO :** The procedure is complete.

**TSB Revision**

## DTC U1417: Invalid variant coding value (including wrong assembly)

⚠ CAUTION

- **If diagnostic trouble code U1417 is set in ABS-ECU, always diagnose the CAN bus lines. If there is any fault in the CAN bus lines, an incorrect diagnostic trouble code may be set. In this case, the set diagnostic trouble code is not highly reliable.**
- **Before replacing the ECU, ensure that the communication circuit is normal.**
- **When diagnostic trouble code U1417 is set in ABS-ECU, the diagnostic trouble code may also be set in ETACS-ECU. When the diagnostic trouble code is set in ETACS-ECU, carry out the diagnosis of the diagnostic trouble code for ETACS-ECU first.**

### CIRCUIT OPERATION

ABS-ECU receives the vehicle information stored in the ETACS-ECU via CAN bus lines.

### DTC SET CONDITIONS

ABS-ECU communicates with ETACS-ECU via CAN bus lines. This diagnostic trouble code is set when there is difference between the vehicle information from the ETACS-ECU and the vehicle information stored in the ABS-ECU.

### PROBABLE CAUSES

- Malfunction of ETACS-ECU
- ETACS-ECUs have been interchanged between two vehicles.
- ABS-ECU malfunction
- ABS-ECUs have been interchanged between two vehicles.

### DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 3.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines**

**Q: Is DTC U1417 set?**

**YES :** Go to Step 3.
**NO :** The procedure is complete.

**STEP 3. M.U.T.-III other system diagnostic trouble code**

Use scan tool to check whether the ETACS-ECU-related diagnostic trouble code is set or not.

**Q: Is any DTC set?**

**YES :** Troubleshoot for the relevant diagnostic trouble code.
**NO :** Go to Step 4.

**STEP 4. Check coding data**

Refer to GROUP 00 –Coding List P.00-35.

**Q: Is the check result normal?**

**YES :** Go to Step 5.
**NO :** Replace ETACS-ECU.

**STEP 5. Check part number of ABS-ECU**

Check the part number of ABS-ECU.

**Q: Is the check result normal?**

**YES :** Go to Step 6.
**NO :** Replace the ABS-ECU.

**STEP 6. Check whether the diagnostic trouble code is reset.**

**Q: Is DTC U1417 set?**

**YES :** Replace the ABS-ECU.
**NO :** The procedure is complete.

## SYMPTOM CHART

M1352011401203

**⚠ CAUTION**

- **ABS may operate in the following conditions without hard braking: Slippery road surface, high-speed turn, and bumpy road surface. When asking the customers, confirm that they have/have not encountered ABS operation in corresponding conditions.**
- **During ABS operation, the brake pedal is pulled forward gradually, and noise occurs at the same time. This is because the brake line pressure varies intermittently to prevent the wheel lock, and not a system malfunction.**
- **During diagnosis, a diagnostic trouble code associated with other system may be set when the ignition switch is turned on with connector(s) disconnected. On completion, check all systems for diagnostic trouble code(s). If diagnostic trouble code(s) are set, erase them all.**

| Symptoms | Inspection procedure No. | Reference page |
|---|---|---|
| Scan tool cannot communicate only with ABS-ECU. | 1 | P.35B-146 |
| Brake warning light stays ON with the parking brake lever released. | 2 | P.35B-148 |
| ABS warning light does not illuminate when ignition switch is turned to the ON position (Engine stopped). | 3 | P.35B-152 |
| Brake warning light does not illuminate when the ignition switch is turned to ON position (Engine stopped). | 4 | P.35B-153 |
| ABS warning light stays ON after the engine is started. | 5 | P.35B-155 |
| Abnormality in brake operation | 6 | P.35B-156 |
| ABS system inoperative | 7 | P.35B-157 |
| ABS-ECU power supply circuit system | 8 | P.35B-158 |

## SYMPTOM PROCEDURES

### Inspection Procedure 1: Scan Tool cannot Communicate only with ABS-ECU.

#### TECHNICAL DESCRIPTION (COMMENT)

When scan tool cannot communicate with the ABS system, the CAN bus line, ABS-ECU power supply circuit system, or ABS-ECU may be faulty.

#### TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Damaged wiring harness and connectors
- ABS-ECU malfunction
- Wrong routing of M.U.T.-III harness
- Abnormality in battery or generator
- Abnormality in power supply voltage to ABS-ECU
- ECU malfunction of other system

**TSB Revision**

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

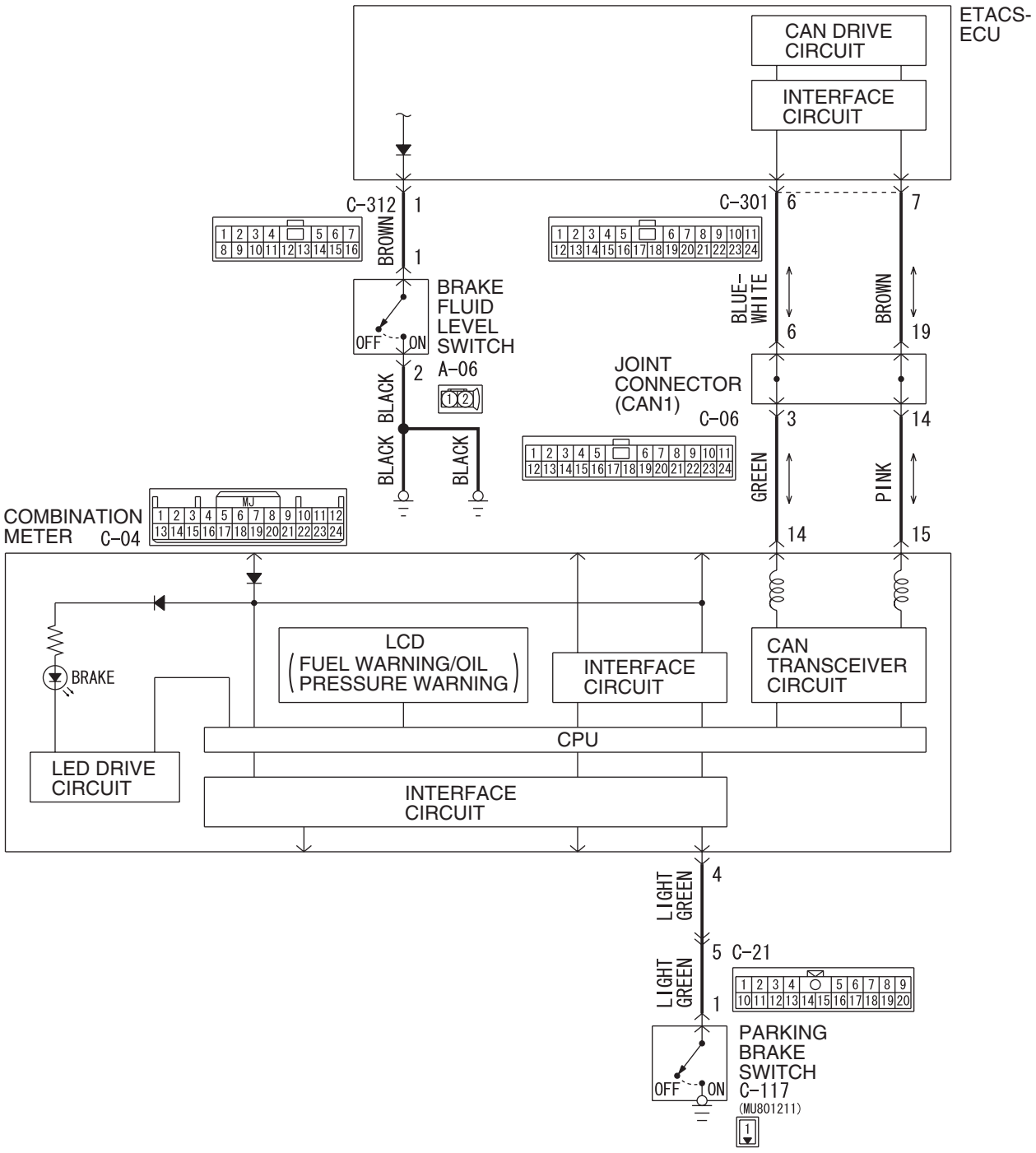
**Q: Is the check result normal?**

**YES :** Check and repair the power supply circuit system (Refer to P.35B-158).

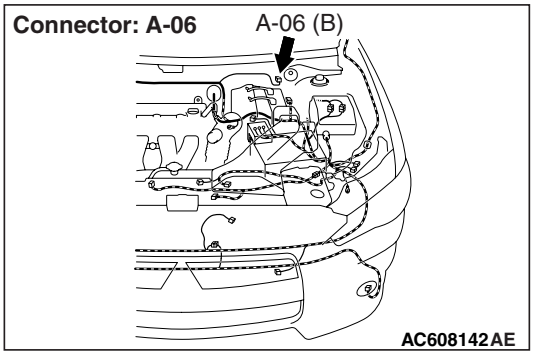
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9).

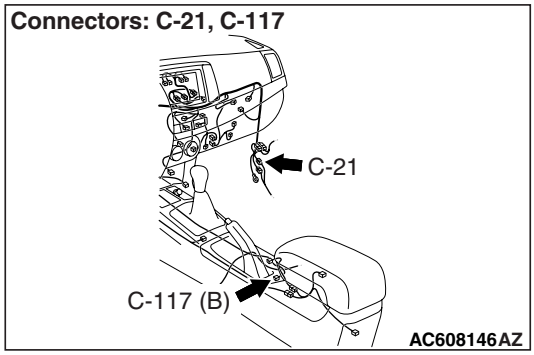
## Inspection Procedure 2: Brake Warning Light Stays ON with the Parking Brake Lever Released.

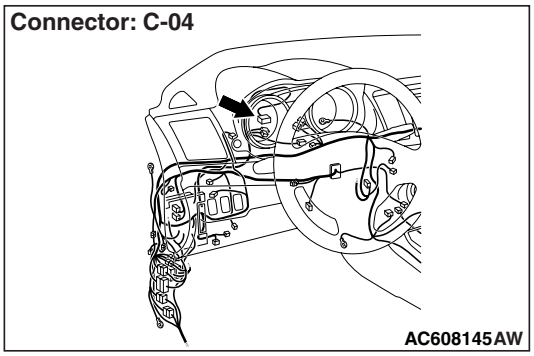
**Brake Warning Light Circuit**

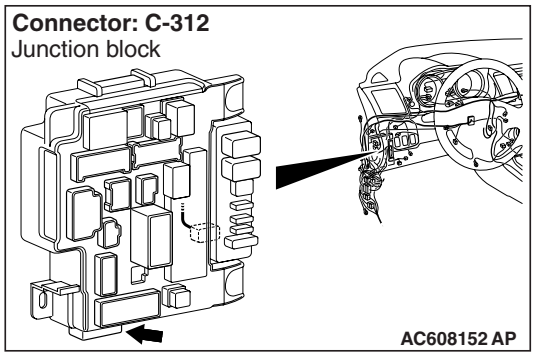



**TSB Revision**




**⚠ CAUTION**

**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## CIRCUIT OPERATION

When the parking brake switch is turned ON, the combination meter terminal No.4 is grounded, and the brake warning light illuminates.

## TECHNICAL DESCRIPTION (COMMENT)

This may be caused by ground fault in the parking brake switch circuit.

## TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Low brake fluid level
- Damaged wiring harness and connectors
- Parking brake switch malfunction
- Combination meter malfunction
- Malfunction of ETACS-ECU
- EBD system malfunction

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**TSB Revision**

**STEP 1. M.U.T.-III CAN bus diagnostics**
Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**
**YES :** Go to Step 2.
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code check after resetting CAN bus lines**

**Q: Is any DTC set?**
**YES :** Carry out the relevant troubleshooting (Refer to P.35B-8).
**NO :** Go to Step 3.

**STEP 3. Brake fluid level check**

**Q: Is the check result normal?**
**YES :** Go to Step 4.
**NO :** Add brake fluid to the specified level.

**STEP 4. Brake fluid level switch check**
Refer to GROUP 35A –On-vehicle Service P.35A-25.

**Q: Is the check result normal?**
**YES :** Go to Step 5.
**NO :** Replace the reservoir assembly.

**STEP 5. Voltage measurement at C-312 ETACS-ECU connector**
- Measure the voltage between the terminal No.1 and body ground.

**OK: Approximately 5 volts**

**Q: Is the check result normal?**
**YES :** Go to Step 6.
**NO :** Replace ETACS-ECU.

**STEP 6. Connector check: C-312 ETACS-ECU connector, A-06 brake fluid level switch connector**

**Q: Is the check result normal?**
**YES :** Go to Step 7.
**NO :** Repair the defective connector.

**STEP 7. Check the wiring harness between the C-312 ETACS-ECU connector terminal No.1 and the A-06 brake fluid level switch connector terminal No.1.**

**Q: Is the check result normal?**
**YES :** Go to Step 8.
**NO :** Check the wiring harness between the C-312 ETACS-ECU connector terminal No.1 and the A-06 brake fluid level switch connector terminal No.1.

**STEP 8. Parking brake lever stroke check**
Refer to GROUP 36 –On-vehicle Service P.36-10.

**Q: Is the check result normal?**
**YES :** Go to Step 9.
**NO :** Adjust the parking brake lever stroke, then go to Step 12.

**STEP 9. Parking brake switch check**
Refer to GROUP 36 –On-vehicle Service P.36-11.

**Q: Is the check result normal?**
**YES :** Go to Step 10.
**NO :** Replace the parking brake switch.

**STEP 10. Voltage measurement at the C-04 combination meter connector**
- Measure the voltage between terminal No.4 and body ground.

**OK: Approximately 5 volts**

**Q: Is the check result normal?**
**YES :** Go to Step 11.
**NO :** Replace the combination meter assembly, then go to Step 12.

**STEP 11. Connector check: C-04 Combination meter connector, C-21 intermediate connector, C-117 parking brake switch connector**

**Q: Is the check result normal?**
**YES :** Repair the wiring harness between the C-04 combination meter connector terminal No.4 and the C-117 parking brake switch connector.
**NO :** Repair the defective connector.

**STEP 12. Retest the system.**

**Q: Does the brake warning light turn ON and OFF normally according to the parking brake lever operation?**
**YES :** The procedure is complete.
**NO :** Return to Step 1.

**Inspection Procedure 3: ABS Warning Light does not Illuminate when Ignition Switch is Turned to the ON Position (Engine Stopped).**

## SYSTEM OPERATION

- ABS-ECU sends the illumination request signal of the ABS warning light to the combination meter through ETACS-ECU via CAN communication.
- ABS-ECU illuminates the ABS warning light via ETACS-ECU for approximately 3 seconds for valve check with the ignition switch turned to the ON position.

## TECHNICAL DESCRIPTION (COMMENT)

This may be caused by faults in the CAN bus line, ETACS-ECU, combination meter or ABS-ECU.

## PROBABLE CAUSES

- Damaged wiring harness and connectors
- Malfunction of ETACS-ECU
- Combination meter malfunction
- ABS-ECU malfunction
- Malfunction of coding data for ETACS-ECU

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 2.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9).

**STEP 2. M.U.T.-III actuator test**

Perform the actuator test No.07 of the combination meter system, and check if the ABS warning light illuminates.

**Q: Is the check result normal?**

**YES :** Troubleshoot the combination meter, then go to Step 3.

**NO :** Go to Step 4.

**STEP 3. Check coding data**

Refer to GROUP 00 –Coding List P.00-35.

**Q: Is the check result normal?**

**YES :** Go to Step 4.

**NO :** Replace ETACS-ECU.

**TSB Revision**

**STEP 4. M.U.T.-III other system diagnostic trouble code**
Using scan tool, check that the diagnostic trouble code No.U0141 is not set by the combination meter system.

**Q: Is the diagnostic trouble code set?**

**YES :** Troubleshoot the combination meter, then go to Step 6.
**NO :** Go to Step 5.

**STEP 5. M.U.T.-III other system diagnostic trouble code**
Using scan tool, check that the diagnostic trouble code No.U0121 is not set by the ETACS system.

**Q: Is the diagnostic trouble code set?**

**YES :** Troubleshoot the ETACS-ECU, then go to Step 6.
**NO :** Replace the ABS-ECU, then go to Step 6.

**STEP 6. Retest the system.**

**Q: Does the ABS warning light turn ON and OFF normally?**

**YES :** The procedure is complete.
**NO :** Return to Step 1.

## Inspection Procedure 4: Brake Warning Light does not Illuminate when the Ignition Switch is Turned to ON Position (Engine Stopped).

### CIRCUIT OPERATION
ABS-ECU sends the illumination request signal of the brake warning light to the combination meter through ETACS-ECU via the CAN communication.

### TECHNICAL DESCRIPTION (COMMENT)
This may be caused by faults in the CAN bus line, ETACS-ECU, combination meter or ABS-ECU.

### PROBABLE CAUSES
- Damaged wiring harness and connectors
- Malfunction of ETACS-ECU
- Combination meter malfunction
- ABS-ECU malfunction

### DIAGNOSIS
**Required Special Tools:**
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**
Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**
**YES :** Go to Step 2.
**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9).

**STEP 2. M.U.T.-III diagnostic trouble code**
Use scan tool to check the diagnostic trouble code for the ABS system.

**Q: Is the diagnostic trouble code set?**
**YES :** Carry out the diagnosis for the diagnostic trouble code (Refer to P.35B-8).
**NO :** Go to Step 3.

**STEP 3. M.U.T.-III other system diagnostic trouble code**
Using scan tool, check that the diagnostic trouble code No.U0141 is not set by the combination meter system.

**Q: Is the diagnostic trouble code set?**
**YES :** Troubleshoot the combination meter, then go to Step 5.
**NO :** Go to Step 4.

**STEP 4. M.U.T.-III other system diagnostic trouble code**
Using scan tool, check that the diagnostic trouble code No.U0121 is not set by the ETACS system.

**Q: Is the diagnostic trouble code set?**
**YES :** Troubleshoot the ETACS, then go to Step 5.
**NO :** Replace the ABS-ECU, then go to Step 5.

**STEP 5. Retest the system.**

**Q: Does the brake warning light turn ON and OFF normally?**
**YES :** The procedure is complete.
**NO :** Return to Step 1.

**Inspection Procedure 5: ABS Warning Light Stays ON after the Engine is Started.**

## SYSTEM OPERATION

- ABS-ECU sends the illumination request signal of the ABS warning light to the combination meter through ETACS-ECU via CAN communication.
- ABS-ECU illuminates the ABS warning light via ETACS-ECU for approximately 3 seconds for valve check with the ignition switch turned to the ON position.

## TECHNICAL DESCRIPTION (COMMENT)

This may be caused by faults in the CAN bus line, ETACS-ECU, combination meter or ABS-ECU.

## PROBABLE CAUSES

- Damaged wiring harness and connectors
- Malfunction of ETACS-ECU
- Combination meter malfunction
- ABS-ECU malfunction

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 2.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9).

**STEP 2. M.U.T.-III diagnostic trouble code**

Use scan tool to check the diagnostic trouble code for the ABS system.

**Q: Is the diagnostic trouble code set?**

**YES :** Carry out the diagnosis for the diagnostic trouble code (Refer to P.35B-8).

**NO :** Go to Step 3.

**STEP 3. M.U.T.-III other system diagnostic trouble code**

Using scan tool, check that the diagnostic trouble code U0141 is not set by the combination meter system.

**Q: Is any DTC set?**

**YES :** Troubleshoot the combination meter, then go to Step 5.

**NO :** Go to Step 4.

**TSB Revision**

**STEP 4. M.U.T.-III other system diagnostic trouble code**
Using scan tool, check that the diagnostic trouble code U0121 is not set by the ETACS system.

**Q: Is any DTC set?**

**YES :** Troubleshoot the ETACS, then go to Step 5.
**NO :** Replace the ABS-ECU, then go to Step 5.

**STEP 5. Retest the system.**

**Q: Does the ABS warning light turn ON and OFF normally?**

**YES :** The procedure is complete.
**NO :** Return to Step 1.

## Inspection Procedure 6: Abnormality in Brake Operation

### TECHNICAL DESCRIPTION (COMMENT)

- Although the cause of the trouble cannot be clearly resolved since it depends on the running status and road surface condition, the malfunction of the hydraulic circuit may occur if any diagnostic trouble code is not detected.

### PROBABLE CAUSES

- Hydraulic unit (HU) malfunction

### DIAGNOSIS

**STEP 1. Hydraulic unit (HU) check**
Refer to P.35B-168.

**Q: Is the check result normal?**

**YES :** Go to Step 2.
**NO :** Connect the brake tubes correctly, repair the external brake lines, or replace the hydraulic unit.

**STEP 2. Retest the system.**

**Q: Can any fault be found with the brake operation?**

**YES :** Check the brake system related components except ABS.
**NO :** The procedure is complete.

**Inspection Procedure 7: ABS System Inoperative.**

**⚠ CAUTION**
**If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be set. Prior to this diagnosis, diagnose the CAN bus lines (Refer to GROUP 54C, Trouble code diagnosis P.54C-9).**

## TECHNICAL DESCRIPTION (COMMENT)

In case of this trouble symptom, ABS system operation may be disabled. Diagnostic trouble code may be set by the ABS system using scan tool.

## PROBABLE CAUSES

- Low battery voltage
- Wiring harness or connector failure of CAN bus line
- ABS-ECU malfunction

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

**STEP 1. M.U.T.-III CAN bus diagnostics**

Use scan tool to diagnose the CAN bus lines.

**Q: Is the check result normal?**

**YES :** Go to Step 2.

**NO :** Repair the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics table P.54C-9). On completion, go to Step 2.

**STEP 2. Diagnostic trouble code check after resetting CAN bus lines**

**Q: Is any DTC set?**

**YES :** Carry out the relevant troubleshooting (Refer to P.35B-8).

**NO :** Go to Step 3.

**STEP 3. Hydraulic unit (HU) check**

Refer to P.35B-168.

**Q: Is the check result normal?**

**YES :** Go to Step 4.

**NO :** Repair the brake pipe or replace ABS-ECU.

**STEP 4. Operation check**

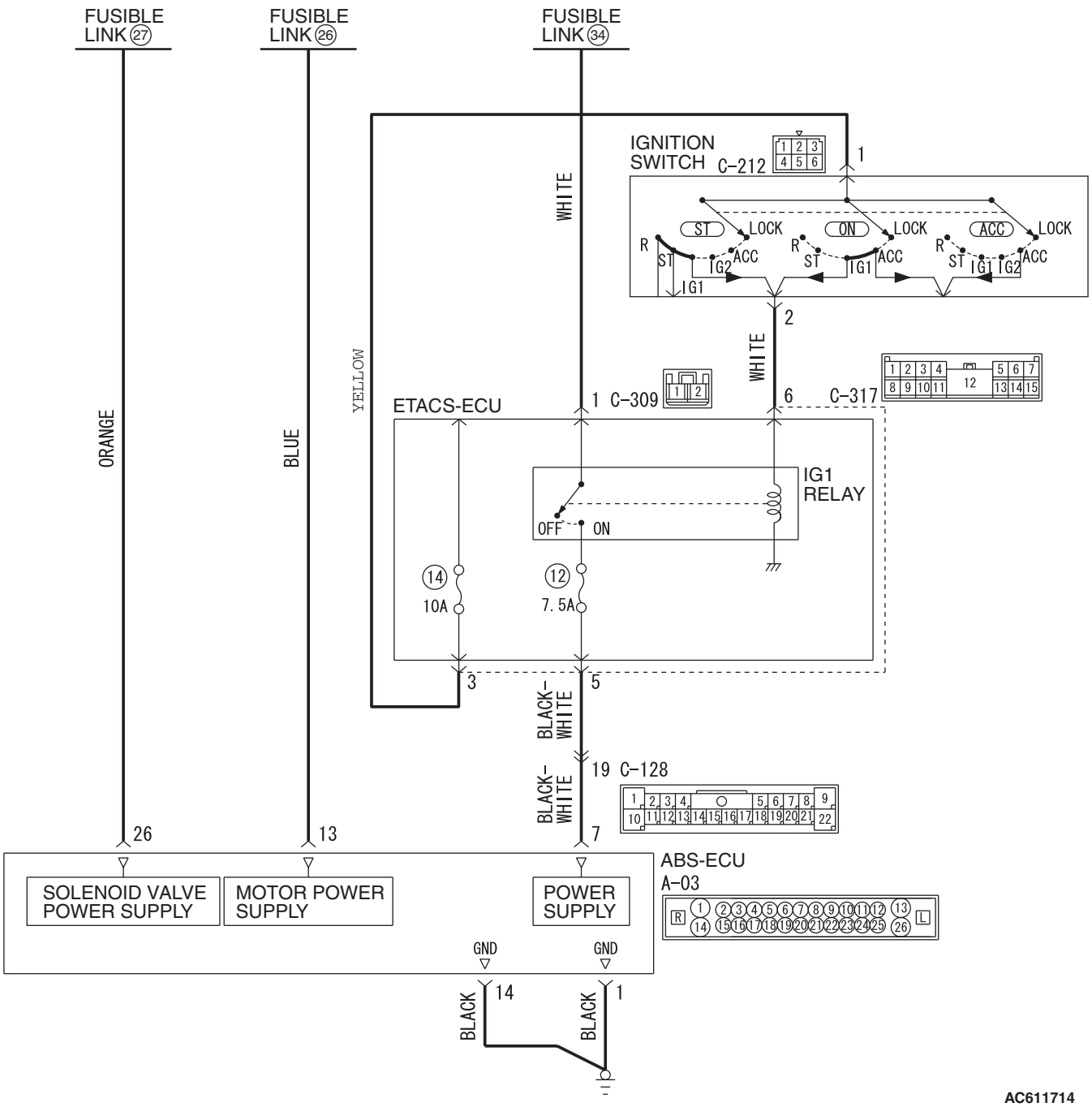
**Q: Does ABS operate normally?**

**YES :** The procedure is complete.

**NO :** Check the brake system related components except the ABS system.

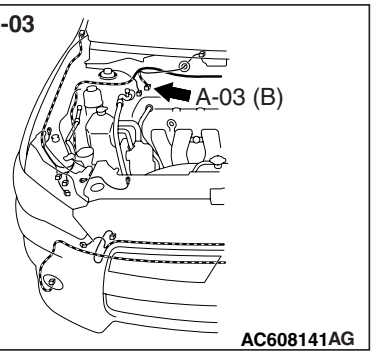
## Inspection Procedure 8: ABS-ECU Power Supply Circuit System

**Power Supply Circuit**



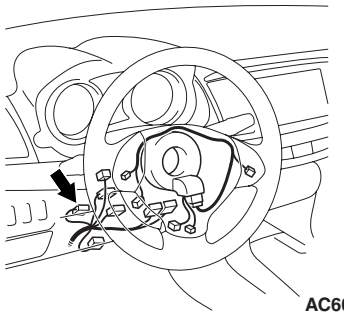

**TSB Revision**

Connector: A-03



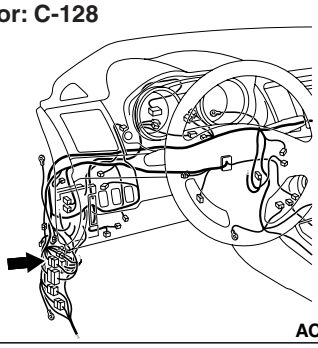

AC608141AG

Connector: C-212



AC608147AH

Connector: C-128



AC608145BP

## SYSTEM OPERATION

- The ABS-ECU power supply signal energized by the ignition switch (IG1) is transmitted to ABS-ECU (terminal No.7) via multi-purpose fuse No.12.
- The ABS-ECU power supply and the valve power supply are transmitted to ABS-ECU (terminal No.26) via fusible link No.27.
- When malfunction occurs in ABS-ECU power supply, the communication with scan tool becomes unavailable.

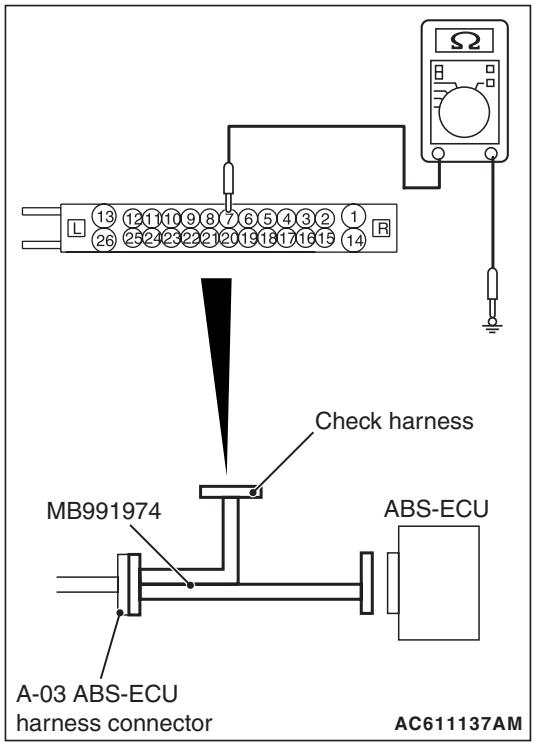
## PROBABLE CAUSES

- Damaged wiring harness and connectors
- Blown fuse
- Battery failure
- Charging system failed
- ABS-ECU malfunction

## DIAGNOSIS

**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB991974: ABS check harness




**STEP 1. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

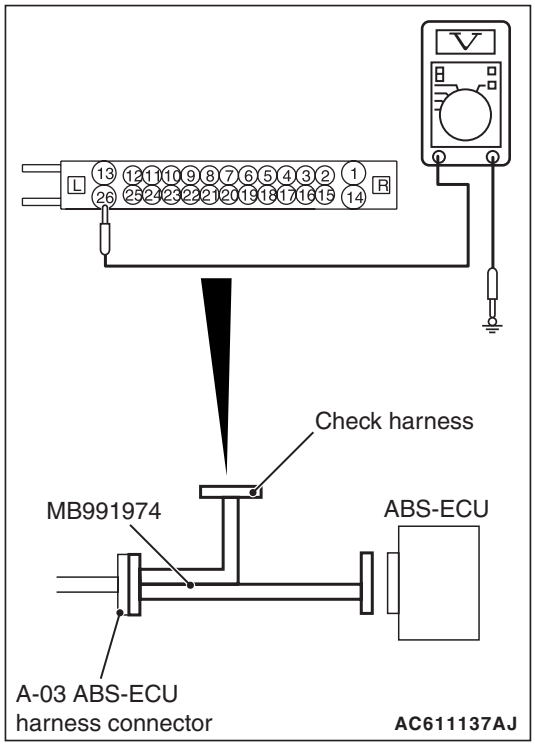
(3) Measure the voltage between terminal No.7 and body ground.

**OK: Approximately battery voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 2.

**NO :** Go to Step 8.




**STEP 2. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

(3) Measure the voltage between terminal No.26 and body ground.

**OK: Approximately battery voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 5.

**NO :** Go to Step 3.

**STEP 3. Check the fusible link No.27**

**Q: Is the check result normal?**

**YES :** Go to Step 4.

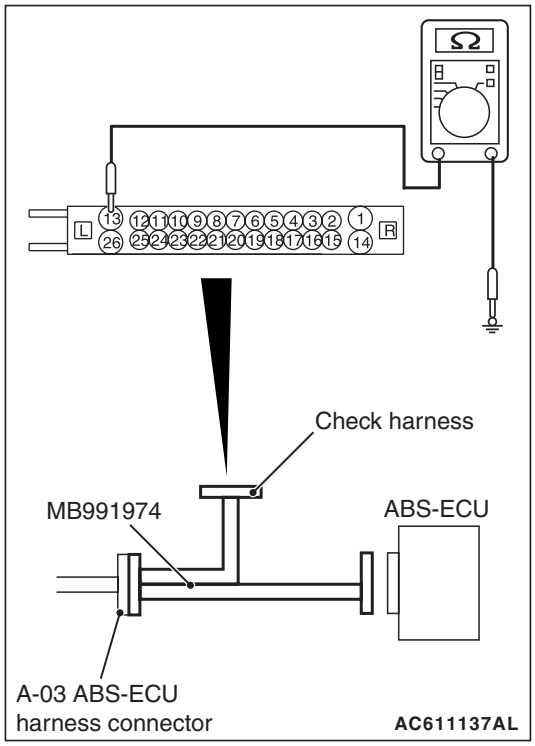
**NO :** Replace the fusible link No.27.

**STEP 4. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** Repair the wiring harness between fusible link No.27 and the A-03 ABS-ECU connector terminal No.32.

**NO :** Repair the defective connector.




**STEP 5. Voltage measurement at the A-03 ABS-ECU connector**

(1) Disconnect the connector, connect special tool MB991974 to the harness-side connector, and measure the voltage at the special tool connector side.

*NOTE: Do not connect the special tool MB991974 to ABS-ECU.*

(2) Turn the ignition switch to the ON position.

(3) Voltage between terminal No.13 and body ground

**OK: Approximately battery voltage**

**Q: Is the check result normal?**

**YES :** Go to Step 9.

**NO :** Go to Step 6.

**STEP 6. Check the fusible link No.26**

**Q: Is the check result normal?**

**YES :** Go to Step 7.

**NO :** Replace the fusible link No.26.

**STEP 7. Connector check: A-03 ABS-ECU connector**

**Q: Is the check result normal?**

**YES :** Repair the wiring harness between fusible link No.26 and the A-03 ABS-ECU connector terminal No.13.

**NO :** Repair the defective connector.

**STEP 8. Check the fuse No.12 and No.14 and fusible link No.34**

**Q: Is the check result normal?**

**YES :** Go to Step 9.

**NO :** Replace the abnormal fusu or fusible link.

**STEP 9. Wiring harness check between the A-03 ABS-ECU connector terminal No.1 and body ground, and between the A-03 ABS-ECU connector terminal No.14 and body ground**

- Check the ground wires for open circuit.

**Q: Is the check result normal?**

**YES :** Go to Step 10.
**NO :** Repair the wiring harness.

**STEP 10. Battery check**

Refer to GROUP 54A –Battery Test P.54A-6.

**Q: Is the battery in good condition?**

**YES :** Go to Step 11.
**NO :** Charge or replace the battery.

**STEP 11. Charging system check**

Refer to GROUP 16 –Output Current Test P.16-8.

**Q: Is the charging system in good condition?**

**YES :** Go to Step 12.
**NO :** Repair or replace the charging system component(s).

**STEP 12. Retest the system.**

**Q: Is the communication with scan tool possible?**

**YES :** An intermittent malfunction may be present (Refer to GROUP 00 –How to Cope with Intermittent Malfunction P.00-13).
**NO :** Make sure that the scan tool cable is properly connected and the V.C.I. switch is ON, and then replace ABS-ECU.

## DATA LIST REFERENCE TABLE

M1352011501062

The following items can be read by the scan tool from the ABS-ECU input data.

The following items of ECU input data can be read using scan tool.

1. The system is normal.

| Item No. | Scan tool display | Check conditions | Normal conditions |
|---|---|---|---|
| 01 | FL wheel speed sensor | Perform a test run of the vehicle. | The speedometer display and the scan tool display almost agree with each other. |
| 02 | FR wheel speed sensor | | |
| 03 | RL wheel speed sensor | | |
| 04 | RR wheel speed sensor | | |
| 05 | Power supply voltage | | System voltage |
| 07 | Brake switch (input) | The brake pedal is released. | OFF |
| | | The brake pedal is depressed. | ON |
| | | – | Undefined |
| 14 | Brake switch | The brake pedal is depressed. | ON |
| | | The brake pedal is released. | OFF |
| 87 | Ignition switch (input) | Ignition switch is "ON" position | ON |
| | | Ignition switch is "START" position | Start |
| 88 | Vehicle speed | Perform a test run of the vehicle. | The speedometer display and the scan tool display almost agree with each other. |
| 105 | Power supply voltage (input) | | System voltage |

2. System shutdown by ECU
   While ABS-ECU is disabled by the diagnostic function, the scan tool displayed data is different from the actual measurement.

## ACTUATOR TEST REFERENCE TABLE

M1352011601003

Using scan tool, the following actuators can be forcibly operated:

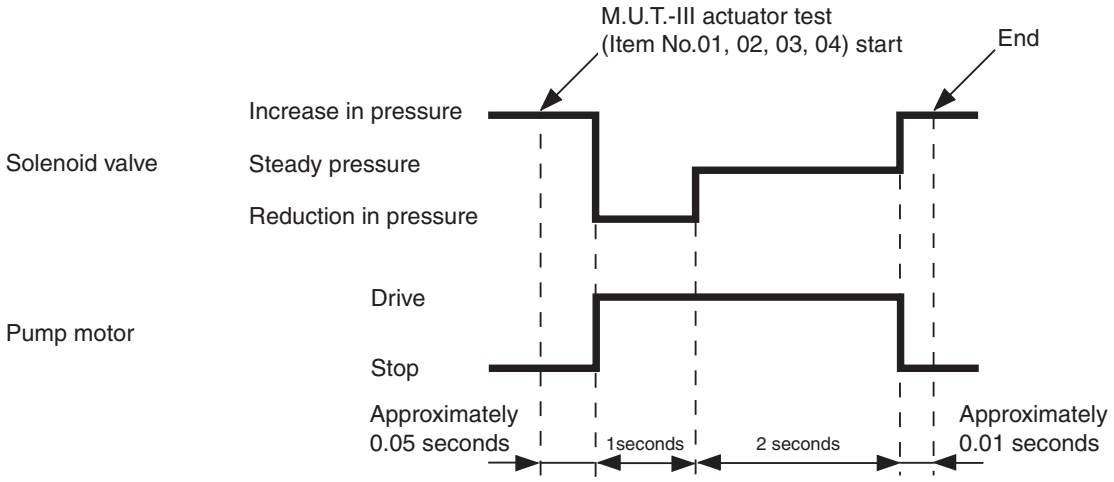
*NOTE:*

- *ABS is operated by ABS-ECU.*
- *When ABS-ECU is disabled due to the fail-safe function, the actuator test cannot be performed.*
- *The actuator test can be performed only when the vehicle is stationary.*
- *While the actuator test is performed, the ABS warning light flashes at a rate of 2 Hz.*
- *After the actuator test has been performed, the brake warning light and ABS warning light illuminate until the ignition switch is turned to ON again or the communication between scan tool and ABS-ECU is terminated.*

### Actuator test specifications

| Item No. | Scan tool display | Driven component |
|---|---|---|
| 01 | FL wheel ABS drive | Solenoid valve for the corresponding wheel of the hydraulic unit and pump motor (simplified inspection mode) |
| 02 | FR wheel ABS drive | |
| 03 | RL wheel ABS drive | |
| 04 | RR wheel ABS drive | |

## Operation pattern of items 01 to 04




AC608796 AB

## CHECK AT ECU TERMINALS

M1352011801052

## TERMINAL VOLTAGE CHECK

**Required Special Tool:**
MB991974: ABS Check Harness
Connect the special tool ABS check harness (MB991974) to measure the voltage between each check connector terminal and the ground terminal (No.1 or 14).

| Terminal No. | Check item | Check conditions | Normal conditions |
|---|---|---|---|
| 7 | ABS-ECU power supply | Ignition switch: ON | Approximately battery voltage |
| | | Ignition switch: OFF | 0V |
| 13 | Motor power supply | Ignition switch: ON (OFF) | Approximately battery voltage |
| 16 | Wheel speed sensor (RR) power supply | Ignition switch: ON | System voltage |
| 18 | Wheel speed sensor (FL) power supply | Ignition switch: ON | System voltage |
| 22 | Wheel speed sensor (FR) power supply | Ignition switch: ON | System voltage |
| 24 | Wheel speed sensor (RL) power supply | Ignition switch: ON | System voltage |
| 26 | Solenoid valve power supply | Ignition switch: ON (OFF) | Approximately battery voltage |

## RESISTANCE AND CONTINUITY BETWEEN HARNESS-SIDE CONNECTOR TERMINALS

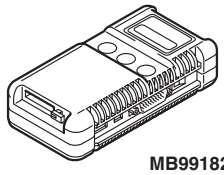
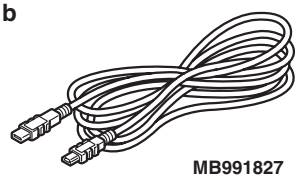
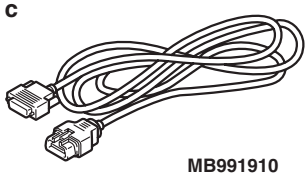
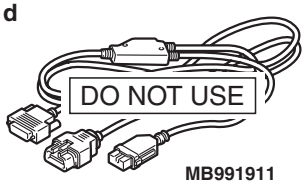
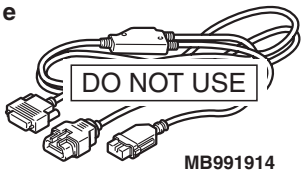
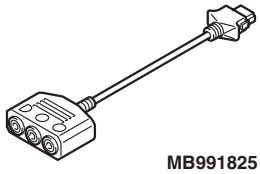
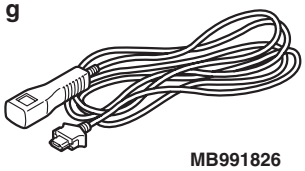
**Required Special Tool:**
MB991974: ABS Check Harness

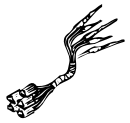
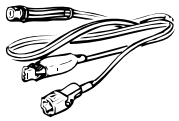
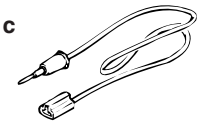
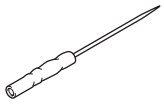
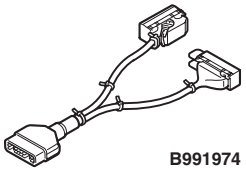
1. When performing the continuity check, turn the ignition switch to LOCK (OFF) position, connect the special tool ABS check harness (MB991974) as shown in the figure, and disconnect the ABS-ECU connector.
2. Check for continuity between terminals shown in the chart below.
3. Terminal layout is shown in the figure.

| Terminal No. | Signal | Normal conditions |
|---|---|---|
| 1 –body ground | Ground | Continuity exists (2 Ω or less) |
| 14 –body ground | Ground | Continuity exists (2 Ω or less) |

# SPECIAL TOOLS

M1352000601355

| Tool | Tool number and name | Supersession | Application |
|---|---|---|---|
| a<br>  <br>MB991824<br>b<br>  <br>MB991827<br>c<br>  <br>MB991910<br>d<br>  <br><br>MB991911<br>e<br>  <br><br>MB991914<br>f<br>  <br>MB991825<br>g<br>  <br>MB991826<br>MB991958 | MB991958<br>a. MB991824<br>b. MB991827<br>c. MB991910<br>d. MB991911<br>e. MB991914<br>f. MB991825<br>g. MB991826<br>M.U.T.-III sub assembly<br>a. Vehicle communication interface (V.C.I.)<br>b. M.U.T.-III USB cable<br>c. M.U.T.-III main harness A (Vehicles with CAN communication system)<br>d. M.U.T.-III main harness B (Vehicles without CAN communication system)<br>e. M.U.T.-III main harness C (for Daimler Chrysler models only)<br>f. M.U.T.-III measurement adapter<br>g. M.U.T.-III trigger harness | MB991824-KIT<br>*NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.* | **⚠ CAUTION**<br>**M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.**<br>ABS system diagnostics |

| Tool | Tool number and name | Supersession | Application |
|---|---|---|---|
| a<br>  <br>b<br>  <br>c<br>  <br>d<br> <br><br>MB991223 | MB991223<br>a. MB991219<br>b. MB991220<br>c. MB991221<br>d. MB991222<br>Harness set<br>a. Test harness<br>b. LED harness<br>c. LED harness adaptor<br>d. Probe | General service tools | Continuity check and voltage measurement at harness wire or connector for loose, corroded or damaged terminals, or terminals pushed back in the connector.<br>a. Connector pin contact pressure inspection<br>b. Power circuit inspection<br>c. Power circuit inspection<br>d. Commercial tester connection |
|  <br>MB992006 | MB992006<br>Extra fine probe | – | Continuity check and voltage measurement at harness wire or connector for loose, corroded or damaged terminals, or terminals pushed back in the connector. |
|  <br>B991974 | MB991974<br>ABS check harness | – | Measure the voltage and resistance at the ABS-ECU |

# ON-VEHICLE SERVICE

## HYDRAULIC UNIT CHECK

M1352001700943

**Required Special Tools:**

- MB991958: M.U.T.-III Sub Assembly
  - MB991824: Vehicle Communication Interface (V.C.I.)
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

1. Raise the vehicle using a jack and support the specified points with a rigid rack.

**⚠ CAUTION**

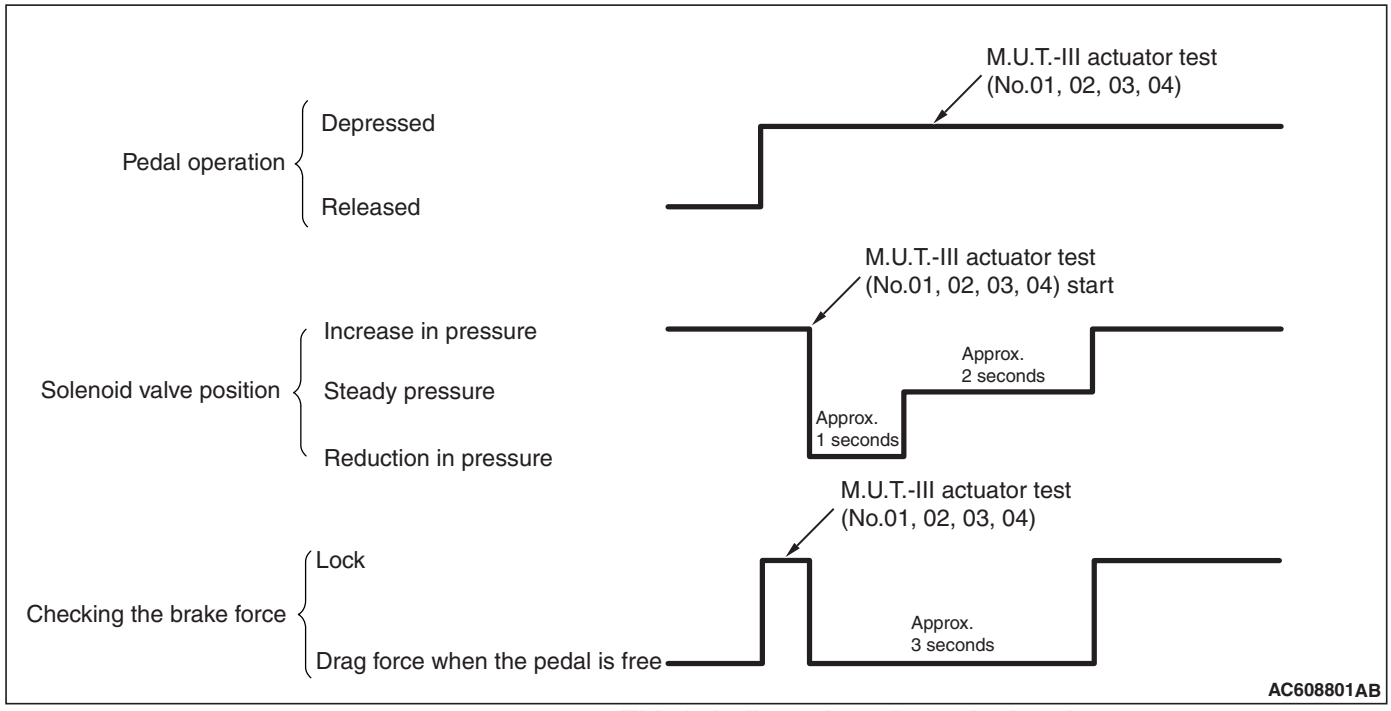
**Before connecting or disconnecting scan tool, always turn the ignition switch to the LOCK (OFF) position.**

2. Before setting scan tool, turn the ignition key to the LOCK (OFF) position.
3. Confirm that the selector lever is in the "N" position, and then start the engine.

**TSB Revision**

4. When carrying out the actuator tests No. 01 to 04, perform the actuator tests using scan tool while depressing the brake pedal. When carrying out the actuator tests, rotate the wheel by hands to confirm that the braking force changes.

   *NOTE:*
   - *While performing the actuator test, the ABS warning light flashes at a rate of 2 Hz.*
   - *When ABS-ECU is disabled due to the fail-safe function, the scan tool actuator test cannot be performed.*
   - *After the actuator test has been performed, the ABS warning light and brake waning light illuminate until the ignition switch is turned to ON again or the communication between scan tool and ABS-ECU is terminated.*




5. This is indicated as shown in the above.
6. When any malfunction has been found, take necessary action according to the "Judgment Table."

**Judgment Table**

| Display on scan tool | Operation | Inspection result | Judgment | Probable cause | Remedy |
|---|---|---|---|---|---|
| 01 FL wheel ABS<br>02 FR wheel ABS<br>03 RL wheel ABS<br>04 RR wheel ABS | • Depress the brake pedal to lock the vehicle.<br>• Select the vehicle to be inspected using scan tool, perform the actuator test.<br>• Rotate the selected wheel by hands to confirm the braking force. | Braking force decreases for 3 seconds from the lock status. | Normal | – | – |
| | | The wheel does not lock even if the brake pedal is depressed. | Error | Clogged brake line other than hydraulic unit | Check and clean the brake line. |
| | | | | Clogged hydraulic circuit in the hydraulic unit | Replace the hydraulic unit assembly. |
| | | Braking force does not decrease. | | Faulty routing of hydraulic unit brake tube | Route the brake tube correctly. |
| | | | | Malfunction of hydraulic unit solenoid valve operation | Replace the hydraulic unit assembly. |

7. After the inspection, turn the ignition switch to the LOCK (OFF) position, and then disconnect scan tool.

## IN THE EVENT OF A DISCHARGED BATTERY

M1352003500804

⚠ ***WARNING***

***If the ABS is not operating, the vehicle will be unstable during braking, Do not drive the vehicle with the ABS-ECU connector disconnected or with the ABS not operating.***

If the engine is started using a booster cable when the battery is completely flat, and the vehicle is then driven without waiting for the battery to be recharged, the engine may misfire and it may not be possible to drive the vehicle. This is because the ABS consumes a large amount of current when carrying out its initial checks. If this happens, recharge the battery fully.

# WHEEL SPEED SENSOR

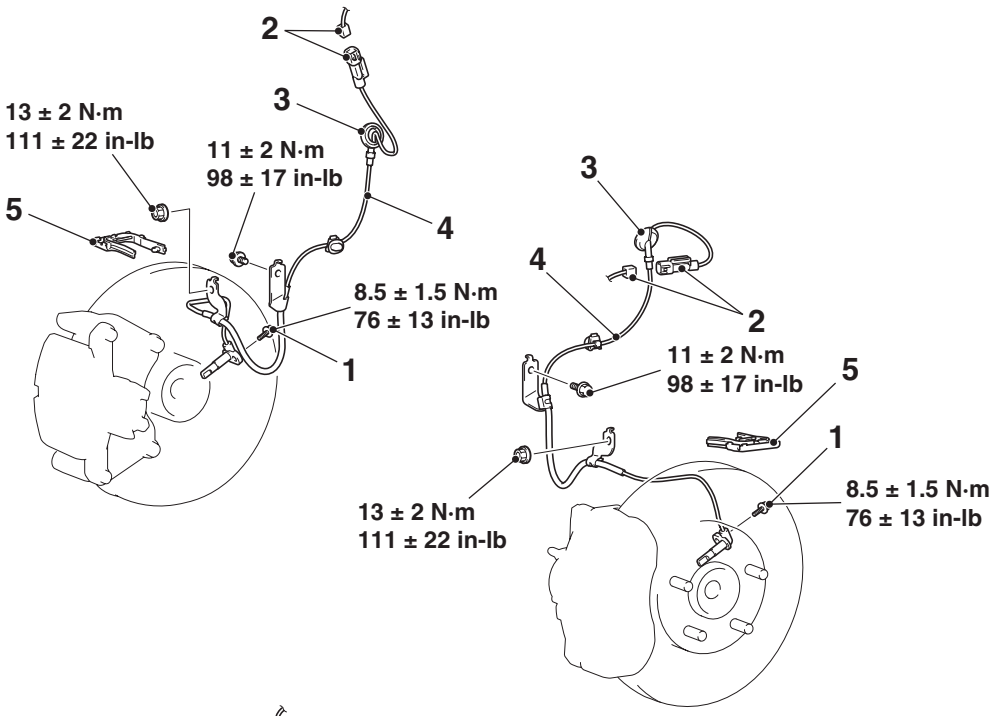
## REMOVAL AND INSTALLATION

M1352008300968

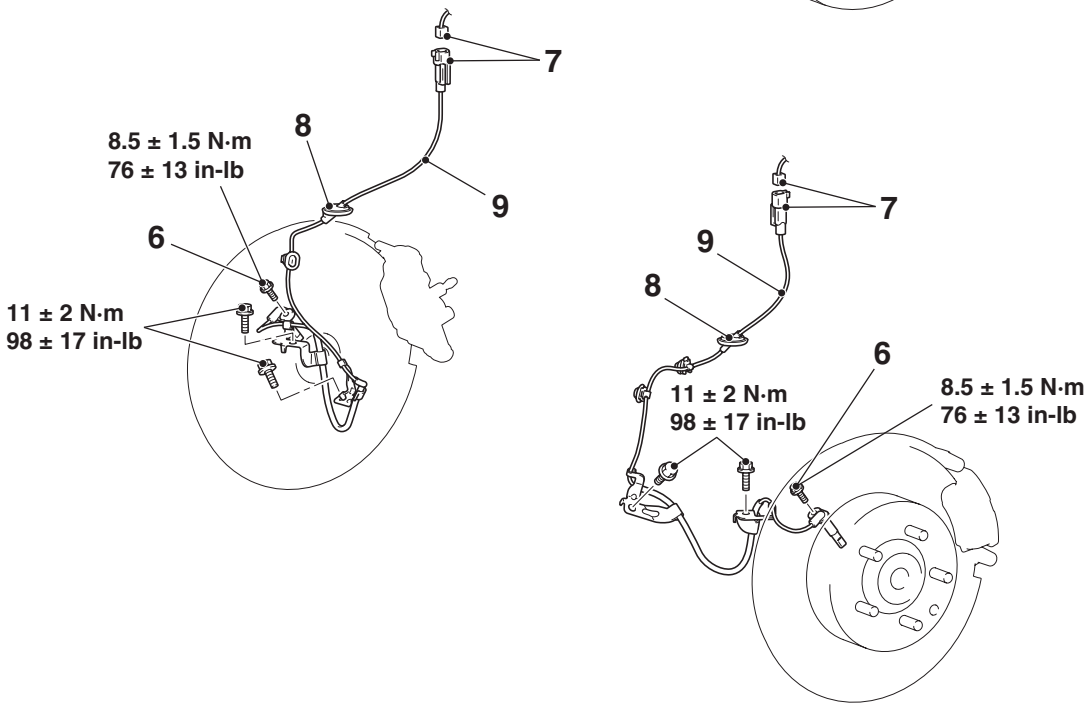
**⚠ CAUTION**

**The vehicle speed detection encoder collects any metallic particle easily, because it is magnetized. Make sure that the encoder should not collect any metallic particle. Check that there is not any trouble prior to reassembling it.**

<Front>




<Rear>




AC608808AB

**TSB Revision**

**Front wheel speed sensor removal steps**

- Air cleaner body assembly (Refer to GROUP 15 –Air Cleaner P.15-4). <LH>

1. Bolt (front wheel speed sensor and knuckle connection)
2. Front wheel speed sensor connector

>>B<< 3. Front wheel speed sensor grommet

4. Front wheel speed sensor

>>A<< 5. Harness clip

**Rear wheel speed sensor removal steps**

- Trunk side trim (Refer to GROUP 52A –Trim P.52A-10).

6. Bolt (rear wheel speed sensor and trailing arm assembly connection)
7. Rear wheel speed sensor connector

>>B<< 8. Rear wheel speed sensor grommet

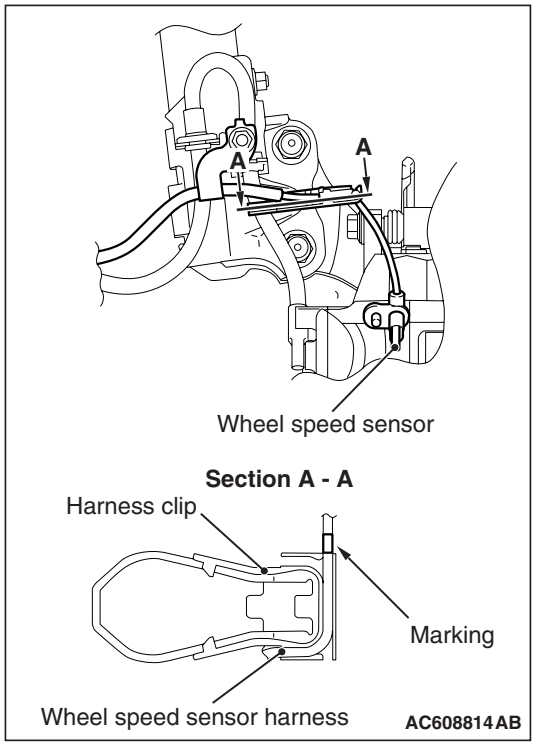
9. Rear wheel speed sensor

*NOTE: The vehicle speed detection encoder is integrated with the front wheel bearing and the rear hub assembly, which cannot be disassembled.*

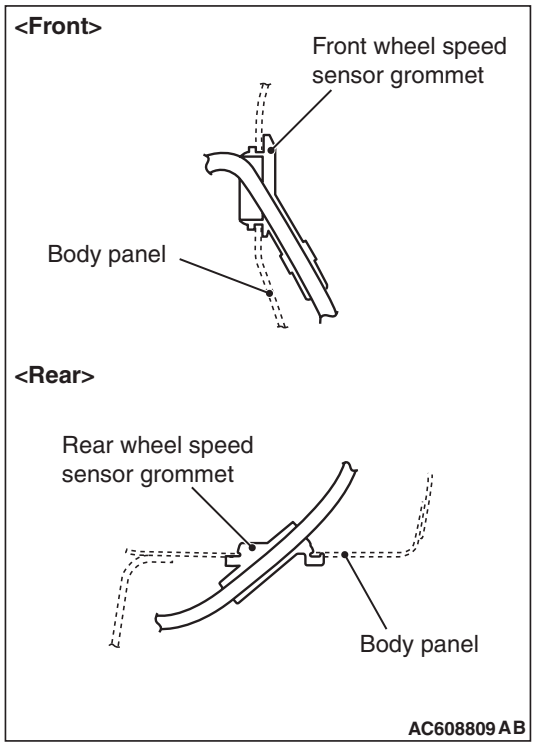
## INSTALLATION SERVICE POINTS

### >>A<< HARNESS CLIP INSTALLATION

Install the front wheel speed sensor to the harness clip as shown in the figure.



## >>B<< FRONT WHEEL SPEED SENSOR GROMMET/REAR WHEEL SPEED SENSOR GROMMET INSTALLATION

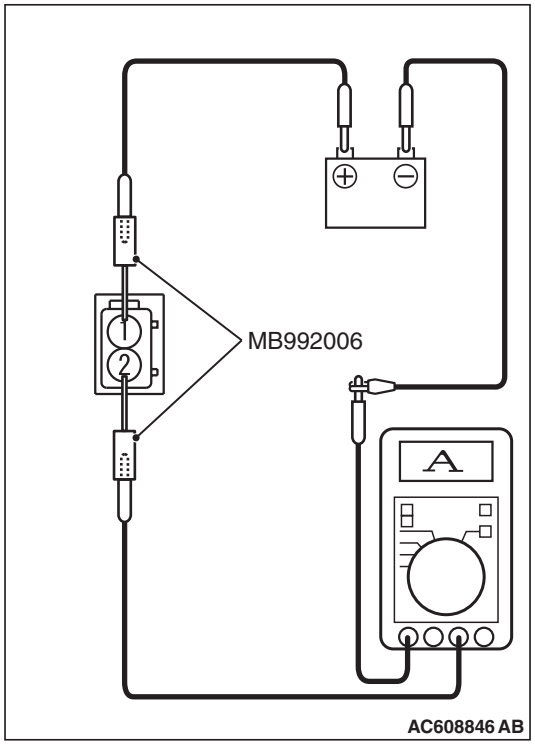



Install the front wheel speed sensor grommet and the rear wheel speed sensor grommet to the body panel snugly as shown in the figure.

## INSPECTION

M1352008400783

## WHEEL SPEED SENSOR CURRENT CHECK



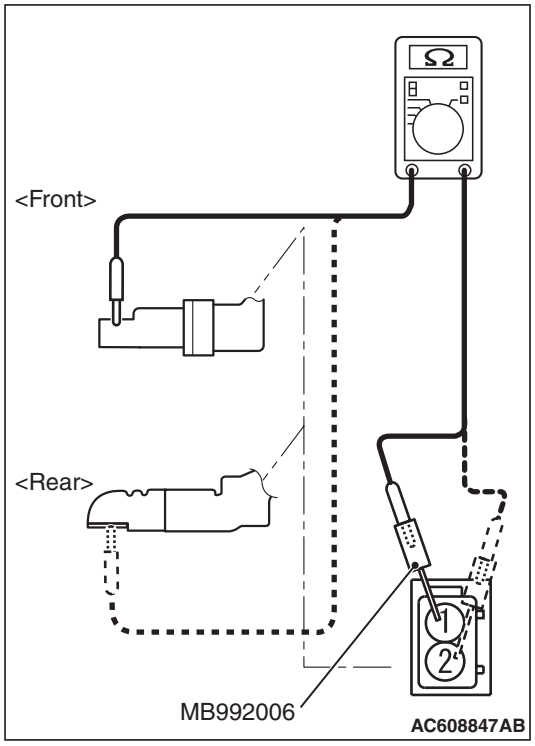

**⚠ CAUTION**

**Do not connect the battery terminals in reverse as the wheel speed sensor may be damaged.**

1. Connect the circuit tester to the wheel speed sensor using the special tool extra fine probe (MB992006), and measure the sensor current as a single unit.

   **Standard value: 5.9 to 8.4 mA or 11.8 to 16.8 mA**

2. If the measurement value is not within the standard value range, replace the wheel speed sensor with a new one.




## WHEEL SPEED SENSOR INSULATION CHECK

1. Connect the circuit tester to the wheel speed sensor using the special tool extra fine probe (MB992006), and measure the insulation resistance between terminal No. 1/2 and the wheel speed sensor body as a single unit.

   **Standard value: 5 MΩ or more**

2. If the insulation resistance is not within the standard value range, replace the wheel speed sensor with a new one.

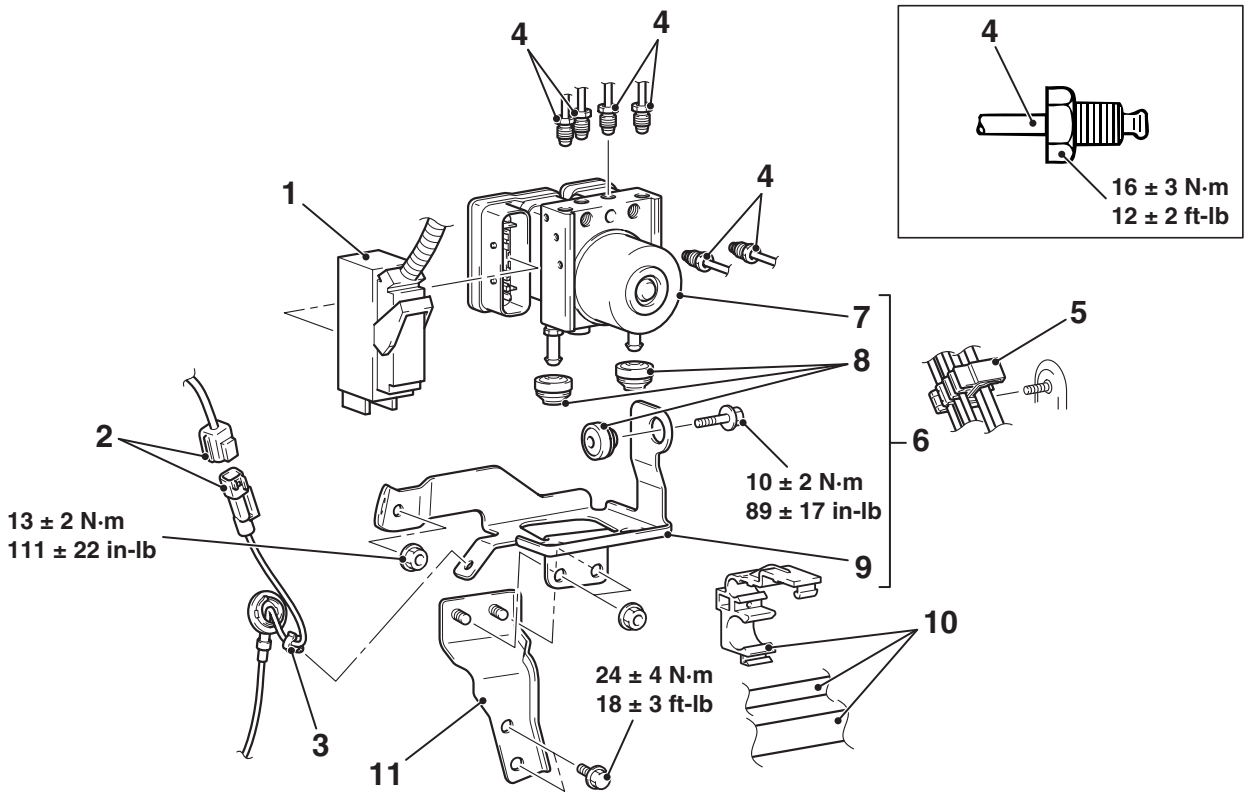
# HYDRAULIC UNIT

## REMOVAL AND INSTALLATION

M1352008600776

*NOTE: ABS-ECU is located in the hydraulic unit.*

| Pre-removal operation | Post-installation operation |
|---|---|
| • Strut tower bar removal (Refer to GROUP 42A –Strut Tower Bar P.42A-11).<br>• Brake fluid draining. | • Brake fluid refilling and air bleeding (Refer to GROUP 35A –On-vehicle Service, Brake Fluid Level Inspection and Bleeding P.35A-25).<br>• Strut tower bar installation (Refer to GROUP 42A –Strut Tower Bar P.42A-11).<br>• Hydraulic unit check (Refer to P.35B-168). |




AC611928AB

**Removal steps**

1. ABS-ECU harness connector
2. Wheel speed sensor harness connector connection
3. Wheel speed sensor harness clip connection

>>A<< 4. Brake tube connection

5. Brake tube clip and body connection

**Removal steps (Continued)**

<<A>> 6. Hydraulic unit (ABS-ECU) and hydraulic unit bracket

7. Hydraulic unit (ABS-ECU)
8. Hydraulic unit bracket insulator
9. Hydraulic unit bracket B
10. Suction pipe, liquid pipe and clip connection
11. Hydraulic unit bracket A

**TSB Revision**

## REMOVAL SERVICE POINT

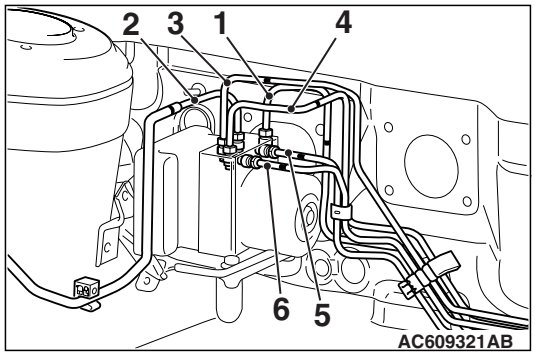
## <<A>> HYDRAULIC UNIT (ABS-ECU) REMOVAL

**⚠ CAUTION**

- **Be careful when removing the hydraulic unit because it is heavy.**
- **Never loosen the nuts and the bolts because the hydraulic unit cannot be disassembled.**
- **Do not drop or shock the hydraulic unit.**
- **Do not turn the hydraulic unit upside down or lay down the unit because the inner air becomes difficult to be bled.**

## INSTALLATION SERVICE POINT

## >>A<< BRAKE TUBE CONNECTION




Install the brake pipe to the hydraulic unit as shown in the figure.

1. From master cylinder (primary) <Marking color: Blue>
2. To front brake (RH) <Marking color: Orange>
3. To front brake (LH) <Marking color: Red>
4. From master cylinder (secondary) <Marking color: Yellow>
5. To rear brake (RH) <Marking color: Pink>
6. To rear brake (LH) <Marking color: White>